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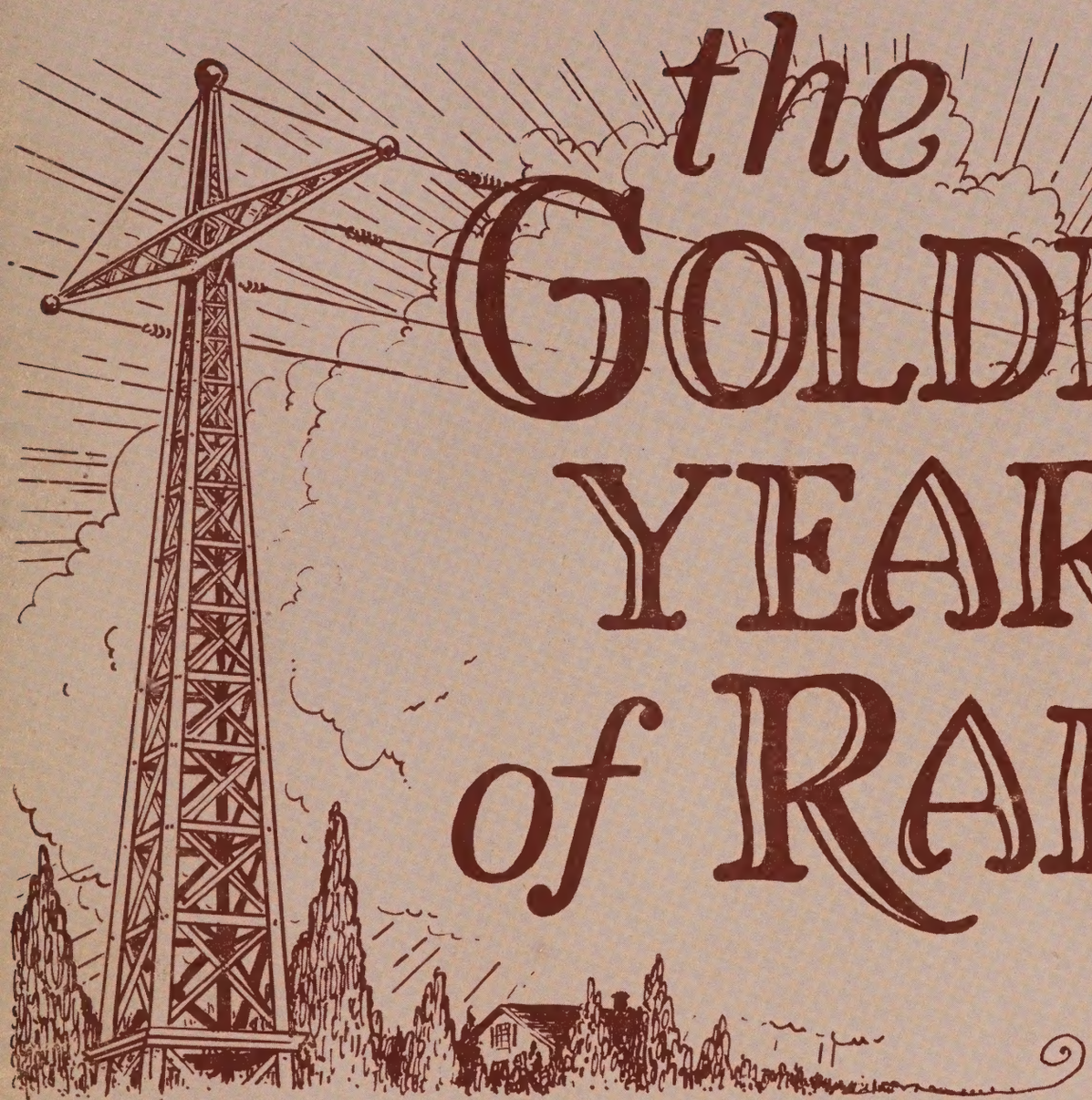

the GOLDEN YEARS of RADIO

Amateur Radio Comes of Age

by the Staff of the Ham Radio Publishing Group

FIRST EDITION
FIRST PRINTING — 1978

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Introduction

Radio nostalgia — stories of how it was when radio was much younger, when almost everything was new to the field of electricity and communications, when there was adventure to be found at every twist of the dial. The popularity of these stories today is nothing short of astounding. It is most understandable that the old-timers among our ranks like to remember and enjoy again the thrills of hearing that ever-so-weak shortwave station as it climbed up through the noise of the regenerative receiver, of checking the filament glow in that new tube by dimming the lights and *slowly* bringing up the rheostat, or, for the really old hands, of carefully tapping the coherer detector "just right" to bring in the sizzling ring of the coastal spark station calling a shipboard operator for a traffic schedule. Unpredictable, and gratifying, is the fact that many of the newcomers to amateur radio really go for these stories too. They seem to have it made with today's technology — digital frequency readout, super-selective filters, antenna couplers that match almost anything metallic, an endless selection of rigs, a frequency spectrum that goes on and on — yet there is a mystical something about tales of yesteryear that draws them like magnets. Perhaps they're trying to find insight as to what makes the amateur radio hobby so obsessive, or they're trying to understand the thinking and drive of the pioneers who pursued the new-found theories no matter where the trail led. Or, could it be that today's amateur is making sure of the foundation of his avocation, in order to more fully appreciate the miracle of modern equipment.

Whatever the reason for this interest, we're glad to be a part of the information exchange. And it is an exchange — we present the stories from authors who have been there in life or through research, and we receive comments from readers who enjoy what we have presented. Frequently those comments are accompanied by suggestions, which

we in turn relate to our authors, thus starting the exchange again. It's a fascinating process, and a growing one.

We've selected some of the more popular tales from the pages of *ham radio* and *Ham Radio Horizons* to be presented in this booklet. There's enough variety to whet your appetite in many ways. Early Wireless operation from Catalina Island? The first Wireless in Alaska? Early day Broadcasting? They're all here. How about operating a station aboard the President's railroad car, back when that was a popular means of traversing the country? The operator who did it tells you about the equipment and some of the trips.

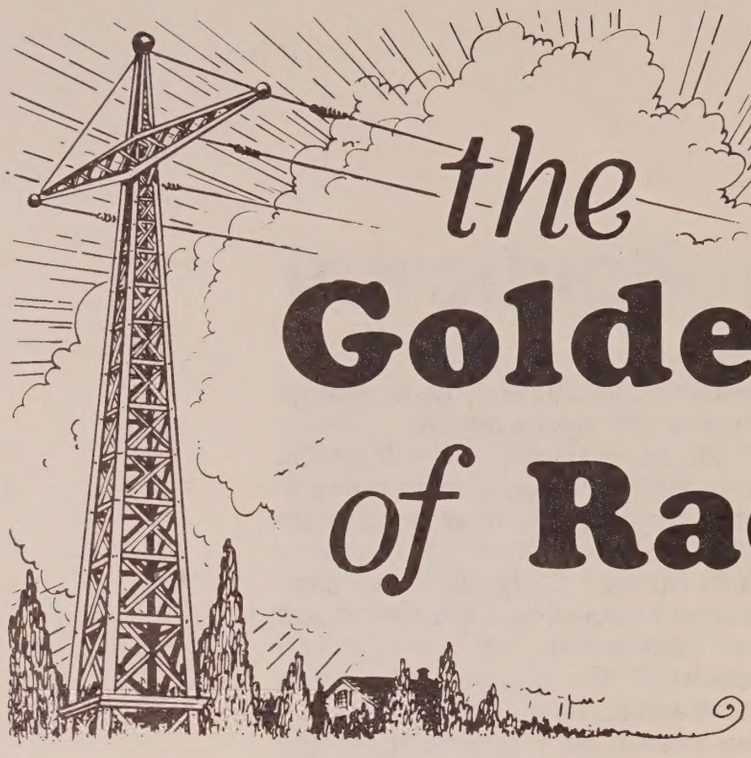
April — the anniversary month of the sinking of the Titanic — how does that tie in with amateur radio? It's a chilling story in many ways.

Then there is the "Golden Years of Amateur Radio" series. These stories touch upon many parts of the amateur past. Low-cost equipment, home-built equipment, early vhf work, and more; guaranteed to be entertaining and educational.

We think you'll like this sampling of the pages of our two magazines; the youngest of the duo, *Ham Radio Horizons*, promises to bring you more of the same. This magazine fills a unique spot in amateur radio; it helps the nonamateur to become one, then helps him as a beginner to improve his skills and knowledge in order to rise in the ranks of amateur fellowship. At the same time, *Ham Radio Horizons* is reminding the older hands of their heritage, asking for their help with the beginners, and providing one and all with some just plain "good reading."

So, get settled into your favorite chair, have a few snacks nearby to munch on, prop your feet up on the stool, and enjoy some of our readers' favorite selections from *Nostalgia*.

Thomas McMullen, W1SL



the Golden Years of Radio — 1929-1941

BY BILL ORR, W6SAI

Once upon a time, in an era seen through an opaque veil of memory, there existed a Golden Age of amateur radio. Forged in the boom-and-bust year of 1929, the period ran until December 7, 1941, when amateur radio was closed down "for the duration".

These dozen years encapsulated important technical developments that form the basis of amateur radio today. The period opened with the demise of the battery-operated radio and closed with amateur radio into the developmental stages of vhf fm techniques, single sideband, double-conversion receivers and high-gain beam antennas. It was a period of confusion and technical advancement, with the shadows of the great depression and the coming World War always in the background.

It was during the Golden Years that the amateur population of the United States exploded (**Fig. 1**). The number of amateurs jumped from 16,829 in 1929 to 54,502 in 1941, the greatest growth being in the years between 1929 and 1934. Before 1929, the American public was bemused by radio broadcasting, which reached the proportions of a craze. New radio stations were coming on the air daily, battery receivers and do-it-yourself kits were popular, and the general public adopted the new sport of radio listening much in the manner of later fads such as miniature golf and the hula hoop. However, by 1929 the broadcast craze was over. The battery radio had given way to the ac operated receiver, which was rapidly becoming a piece of household furniture instead of a seven-day wonder, and commercial broadcasting was a way of life. Until then amateur radio had been overshadowed in the public eye by broadcast listening (an immensely larger hobby) and had remained an esoteric retreat for a few dedicated individuals and eccentrics — a compact group shielded from the general public by their reticence, and by a widespread interest in broadcast reception.

Gradually, the general public became aware of shortwave radio, due partly to the publicity given radio amateurs who pioneered the advance into the shorter wavelengths and led the way on long-distance, high-frequency communications. About the same time, international short-wave broadcasting was started by a few pioneering stations and the American public was thrilled to hear the sounds of Big Ben in London rebroadcast across the country via a transatlantic short-wave relay.

At the depth of the great depression in 1932, with over one-third of the work force unemployed, young men with idle time on their hands discovered amateur radio and the exciting short waves. Almost overnight short-wave listening and amateur radio caught the public eye and boomed. Short-wave reception, a quick fad, was featured in weekly newspaper columns and the new radios of 1933, in their pristine cathedral-shaped cabinets, boasted at least one short-wave band on their multi-colored dials.

The radio ham of 1930,

probably unemployed, with little money and plenty of spare time, faced the serious problem of getting on the air at little or no cost to his flat wallet. His technical background was that of a high-school graduate, or a graduate of an electrical correspondence or trade school. Only a small percentage of amateurs were college engineering graduates. Many of the older radio amateurs, of course, worked in the radio industry or in broadcasting, but the just-licensed amateur did not seem to follow the pattern set by his elders.

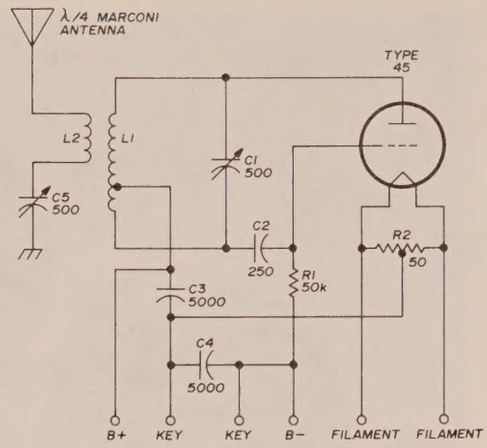
The task of assembling a ham station was formidable. While many radio stores existed — many more than today — credit was unknown and all purchases were for cash. The price of components and equipment was startlingly high considering the state of the economy. A high school graduate would be pleased to get a job paying $5 a week for 50 hours of work, and radio technicians, on the average earned from $20 to $30 a week. Most radio components and tubes, however, cost more in 1930 than their modern counterparts do today! It was not until about 1934, when the radio industry geared up for large scale production of inexpensive household radios, that the cost of components dropped sharply.

Nevertheless, the newcomer was not without sources of radio parts. He scrounged from his friends, haunted the dusty back room of the local radio repair shop for castaway battery receivers, and took an occasional trip to the "radio row" of the nearest big town. With a free, broken-down battery receiver, a few used tubes and a cheap B-eliminator power supply he was ready to build his station and get on the air. Many of today's old timers remember this adventure well. This is the story of how it was done, and the results.

1930 beginner's transmitter

The development of the amateur receiver will be discussed at a later date, but here we'll concentrate on a representative beginner's transmitter of the early 1930s. One or two basic circuits were widely popular at that time, circuits that were easy and inexpensive to build and sure-fire in operation. Both were single tube, oscillator-style transmitters.

The transmitter was designed around available parts and a good starting point was the readily obtainable, defunct battery receiver of the late twenties. During the lean years of the early 1930s the great majority of amateurs worked CW with a power input of 50 watts or less and many amateurs enjoyed operating with a power level of only 5 or 10 watts. With luck, then, a beginner could join this group and have a lot of fun. The old



C1, C5 500 pF variable (Cardwell)
C2 250 pF mica
C3, C4 5000 pF mica
L1 10 turns no. 12 (2mm) enameled wire on 2-1/8″ (5.4cm) diameter bakelite form. Winding length is 2-1/2″ (6.4cm)
L2 Same as L1. Adjust spacing between coils for proper coupling
R1 50k, 2-watt IRC metallized resistor
R2 50-ohm wirewound resistor, center tapped

Fig. 2. The series-fed Hartley oscillator. Operating in the 80-meter band with a plate supply of 300 volts, this transmitter provides a 7-watt signal. In addition to the components listed above, also needed are five Fahnestock clips, a 4-prong tube socket, and two brown "beehive" insulators to support the coil. Antenna is connected to a series-tuned circuit which is inductively coupled to the oscillator coil.

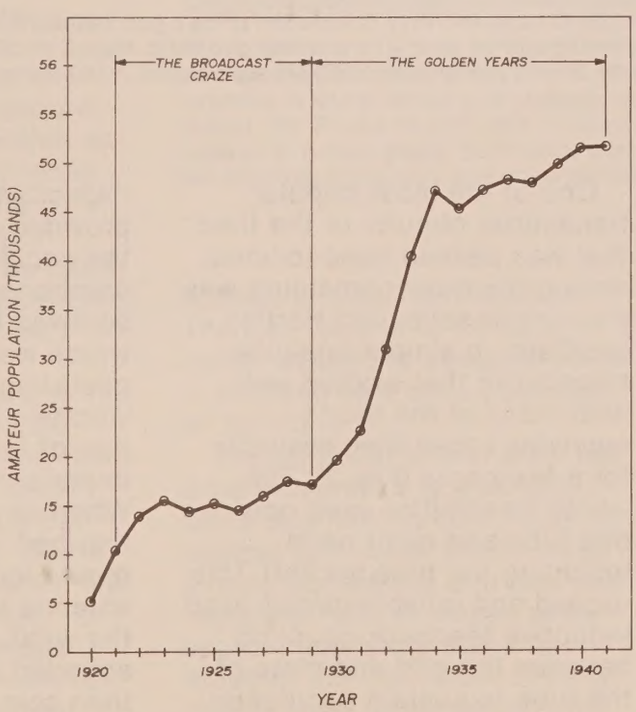


Fig. 1. Amateur radio experienced five years of explosive growth between 1929 and 1934, the "population" going from 17000 to 47000. This was due, in part, to the end of the broadcast craze and the introduction of the ac-operated, entertainment broadcast radio. All through the 1920s the American public had a love affair with broadcasting and building broadcast receivers was a popular pastime. When the great depression arrived in 1929 many young men found themselves unemployed with plenty of time on their hands. Short-wave radio provided the next great interest, and amateur radio grew accordingly. By the start of World War II, the U.S. amateur population stood at about 53000.

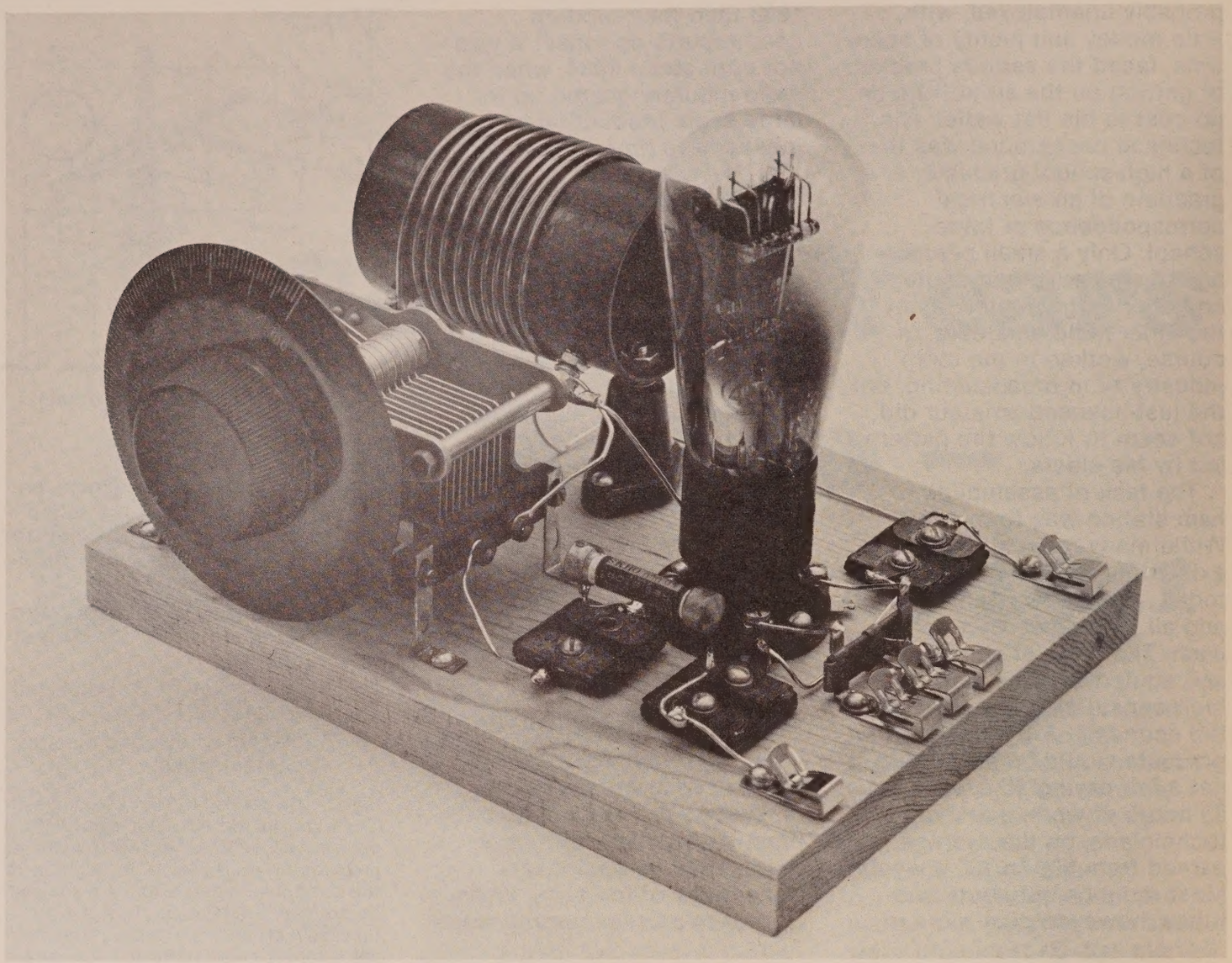


Fig. 3. The way it was done in 1930. Using a single 45 tube, this little transmitter gives a good account of itself in 1976. Built of parts taken from a defunct battery receiver, the Hartley transmitter cost little or nothing to build. High-C circuit provides good stability and when run from a regulated 300-volt power supply, the rig provides a good 1976-style signal. A 160-meter version of this transmitter is shown in the May, 1932 issue of *QST*.

battery receiver could be torn down for parts, and it was easy to buy a second-hand B-eliminator power supply that, for a dollar or less, would provide about 180 volts at 40 milliamperes. That would suffice for a 5-watt transmitter and a lot of amateur stations all across the U.S. could be worked with that power and a good antenna!

For a few more dollars a 300-volt power supply could be assembled from junk parts to provide the amateur with a *real* transmitter — upwards of 20 watts input. The possibilities were limitless.

One of the most popular transmitter circuits of the time that was passed hand-to-hand among the newer amateurs was the simple series-fed Hartley oscillator, a simple one-tube transmitter that worked well with many of the triode receiving tubes then available for a few cents (**Fig. 2**). The whole transmitter used only one tube and eight parts including the tube socket! This rugged and reliable circuit used inductive feedback coupling between the grid and plate of the tube to sustain oscillation. A very high-C tuned tank circuit minimized the effect of capacitance changes and provided dynamic stability to the oscillator. The simple components were firmly screwed to a heavy board which was isolated from the operating table so that any vibration caused by manipulation of the key would not be imparted to the oscillator. When run from a power supply that had reasonably good regulation, and used with a taut antenna that did not swing in the wind, the little transmitter sounded as good (or better) than some of today's more sophisticated equipment.

A re-creation of the famous

1930s' Hartley transmitter is shown in the photograph of **Fig. 3**. Built in 1976 with hard-to-find 1930 components, this rig has been on the air and has been used to work a number of stations on 80-meter CW. Using a 245 triode at 300 volts and 50 milliamperes plate current (15 watts input), the transmitter puts out a solid 7 watts with good stability. The 245 was a popular tube because it could often be obtained free, for a few cents used, or as a manufacturer's "second" for 39 cents.

A *Cardwell* receiving-type variable capacitor is used, and the tank coil is wound on a genuine bakelite form. The bypass capacitors are uncased mica units, rugged and reliable, but already going out of style as bakelite-cased capacitors came into vogue in 1930. Time to assemble and test the transmitter is about three hours, including giving the "breadboard" a coat of shellac.

The transmitter is keyed in the filament return circuit. Since no waveshaping is included, the keying is *hard* so the resultant waveform may distress a nearby amateur who is operating close to the frequency of the midget transmitter. Any attempt to include a keying filter should be approached with caution as softening of the keying tends to place a "yoop" on the signal. A slight amount of filtering, however, can be used to advantage without disturbing the crystal-like note of the transmitter.

The rf plate impedance of the 245 oscillator is about 3000 ohms. The L/C ratio of the plate tank circuit provides a Q of about 30. The circulating current in the tank circuit, therefore, runs about 6 amperes. The tank coil and leads to the variable capacitor are made with number-12 (2mm) wire to carry this amount of current. The oscillator runs well into the class-C region as the rms grid voltage is close to 140 volts. The μ of the 245 is 3.5 so a cutoff voltage of about 85 volts is required at a plate potential of 300 volts.

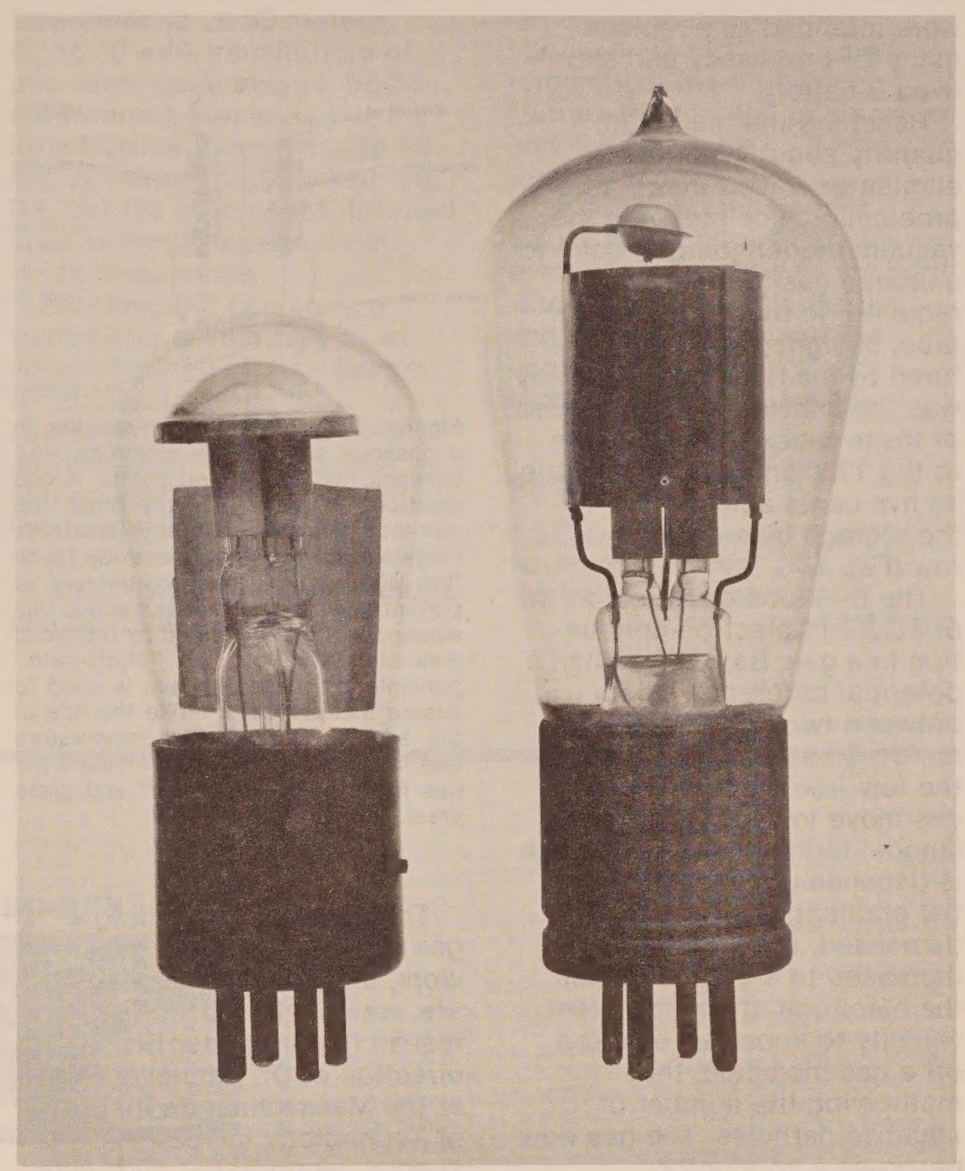


Fig. 4. An early full-wave rectifier: the Raytheon BH tube. Designed for B-eliminator service, the BH tube provided up to 180 volts dc at a maximum current of 50 milliamperes. A late production BH tube is shown at left, with an early, brass-based predecessor, the B tube at right (the H standing for "heavy duty"). The larger B tube was rated at 30 milliamperes. Both tubes were gas types with no filament. Shortly after the BH tube was designed it was made obsolete by the 280 (later type 80) vacuum rectifier.

The simplest antenna for the little transmitter is a 66-foot (20m) end-fed Marconi, working against ground. A series-tuned circuit, consisting of a coil and capacitor (whose values are approximately the same as those in the main tank circuit) can be used. Alternatively, the same series-tuned circuit can be used to match into a coaxial feed system for a dipole or inverted-V antenna. At W6SAI, a simple 66-foot (20m) wire is used for contacts up and down the West Coast.

Transmitter power supply

A bonanza existed for the penny-pinching 1930's amateur in the flood of obsolete B-eliminator power supplies which were rendered useless by the advent of ac operated broadcast receivers. These units provided up to 180 volts dc at 30 to 50 milliamperes and

were intended as a replacement for the messy and short-lived B-battery.

Reaching the market in quantity about 1926, the B-eliminator solved the rectifier problem by side-stepping the vacuum diode, going instead to a unique gas rectifier which required no filament. The *B-H tube*, designed and manufactured by the Raytheon Company was the answer, and multitudes of these tubes were available to the 1930 amateur for as little as five cents apiece in the storage bins on radio row (**Fig. 4**).

The B-H tube operated on the principle of electron conduction in a gas. Basically, when a potential difference exists between two cool metallic surfaces separated by a gas, the few free electrons in the gas move toward the positive (anode) terminal at a rate which is dependent upon the potential gradient. As the gap is decreased, the gradient is increased to a point at which the electrons attain sufficient velocity to knock an electron off a gas molecule, thus multiplying the number of negative particles. The gas now becomes a conductor.

When one electrode is larger than the other, the current will flow from the large electrode to the small one, and when one electrode is point-size, the current flow is practically unidirectional. This means that the anode must be very small in size compared to the cathode and, unfortunately, the anode dissipation is high per unit area. As a result anode material and insulation assume critical proportions.

*The BH tube was developed from pioneering work in the field of gas conduction done in 1916 by Charles G. Smith of Raytheon, aided by J. A. Spencer and M. Andre of *La Radio Technique* of Paris, France. By 1926 more than twenty companies in the United States were licensed by Raytheon to manufacture B-eliminator units using the BH tube.

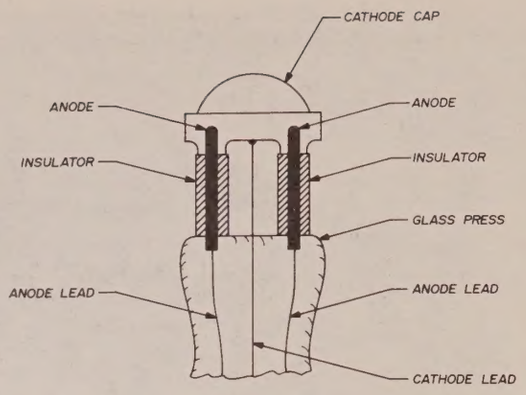


Fig. 5. Interior of the BH gas rectifier. In a gaseous atmosphere electrons flow between two conducting points. If one electrode is larger than the other, the current flows from the large electrode (negative) to the small electrode (positive). With a point-type anode the reverse current flow is very small but anode dissipation is severely limited by the small area of dissipation. The "short-path" principle (discussed in text) is used to ensure that electrons strike the tips of the anodes. Special, high-temperature lava insulators are used to insulate the tips from the cathode "hat" and glass press.

The problem of building a gas rectifier tube that would work, and deliver reasonable life, was finally solved by a research team under the direction of Dr. Vannevar Bush at the Massachusetts Institute of Technology in 1924.* A special, heat-treated alloy was used for two pin-point anodes, which were surrounded by the larger cathode (**Fig. 5**). The "short-path" principle was used to provide a good insulating ring between the anodes and the cathode. This postulate states that a rarefied gas is an insulator between two areas in close proximity if other *points* exist in greater proximity. Thus, to provide a good insulating ring around the anodes and the cathode, the hat-shaped cathode was shaped so as to completely pass around the cathode supports to utilize the "short path" principle as an insulator. Since the discharge cannot pass between the areas in close proximity, only the points of the anodes are struck by the electrons, leaving the insulating material far enough away from the anode heat and the possible disintegrating effect of high temperature. A complete description of the BH tube appeared in the November, 1925, issue of *QST*.[1]

Viewing those days from these days, it is difficult to see why this round-about approach was taken to develop a full-wave rectifier as diode conduction had been known for many years and various companies were manufacturing vacuum diodes as rectifiers for telephone equipment.

A logical guess is that a patent problem existed in this area. Looking back, it appears that oxide-coated filaments were generally used by the Western Electric Company and thoriated tungsten filaments were used by RCA and their licensees. Since, by agreement, the Western Electric Company was not in the home-entertainment radio business, the possibility exists that the oxide-coated filament was denied RCA and one of the licensees (Raytheon) turned to the gas tube as the only alternative.

Regardless of the actual reasons, technical or otherwise, the first ac power supplies sold to the general public in large quantities used the Raytheon B-H tube and these, in turn, were obsoleted by the double diode, oxide-coated filament 280 rectifier tube which shortly became available through some mysterious inner workings of the infant entertainment electronics industry.

On the air

And so the amateur newcomer was finally on the air! The receiver, a two-stage job using a 201A detector and 201A audio amplifier, was also built from a defunct battery receiver and could be run from the same B-eliminator as the transmitter. An old automobile storage battery provided the filament power. Sometimes a

pair of 199 tubes would be used in place of the 201As — then a no. 6 dry battery would suffice for filament power. With luck the whole station could be assembled for less than five dollars.

The results? Since most amateurs ran low power in those days, the 7-watt transmitter provided a good, workable signal. Looking back through old copies of *QST* reveals that many amateurs, with a transmitter of this type, worked hundreds of stations on 80 meters including contacts with Canada, Mexico and Alaska. Several W6 stations maintained schedules with New Zealand on 80 meters using 10-watt transmitters of this same general type. Some adventurous amateurs put the little Hartley transmitter on 40 and 20 meters and worked real DX, but the problem of drift and stabilty became onerous at those frequencies.

Building and operating a transmitter of this type is an adventure in itself: the search for authentic parts, the assembly and test, and on-the-air operation. When you tell a station you're working about the transmitter the usual reaction is one of amazement — amazement that such results can be obtained with such simple equipment. When you work an old-timer who remembers the little Hartley the reunion is dramatic and brings back a flood of memories.

So hats off and a silent salute to the beginning amateurs of yesterday, many of whom used the little Hartley, and many of whom are the engineers, innovators and industry leaders of today.

Reference

1. Miles Pennybacker, "The Raytheon Rectifier," *QST*, November, 1925, page 38.

ham radio

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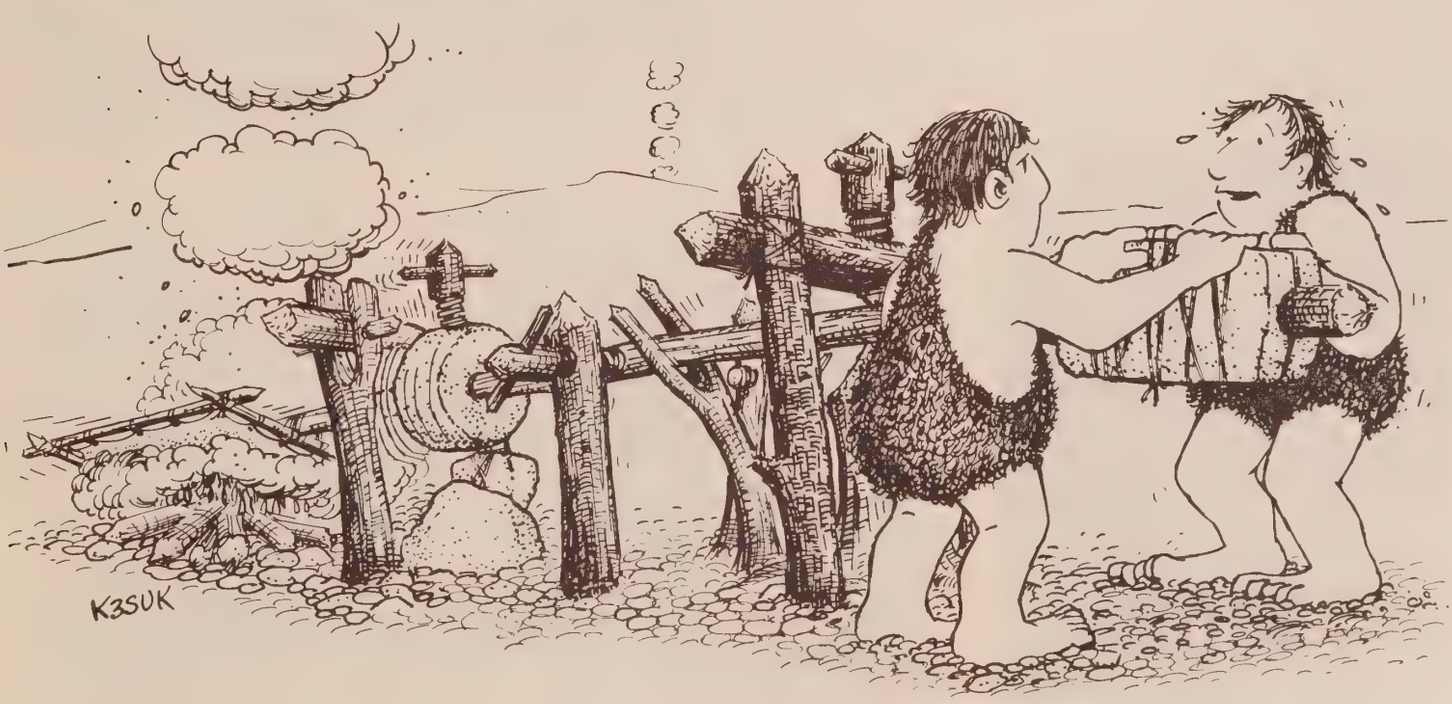
a look at **those days before spark...**



"How about you taking the "dah" side for awhile?"

1937 On The Air For Sixty-One Dollars!

BY WILLIAM ORR, W6SAI

In the year 1937 the United States was a far different place than it is now. No one had heard of sonic booms, tape recorders, rock groups, vinyl flooring, Woodstock, air conditioning, Kentucky Fried Chicken, water beds, hot pants, hula hoops, bikinis, stereo fm, or chain saws.

No one knew about Archie Bunker, William Calley, Muhammed Ali, Spiro T. Agnew, Lee Harvey Oswald, Farah-Fawcett Majors, or Jimmy Carter.

And radio amateurs knew little about single sideband, SSTV, repeaters, Oscar, moonbounce, long-path DX, pocket computers, DXpeditions, transceivers, linear amplifiers, or electronic keyers. It was a world that can not be understood unless one had lived in it. A world only dimly seen today through old movies, books, magazines, and the faded memories of those who were there.

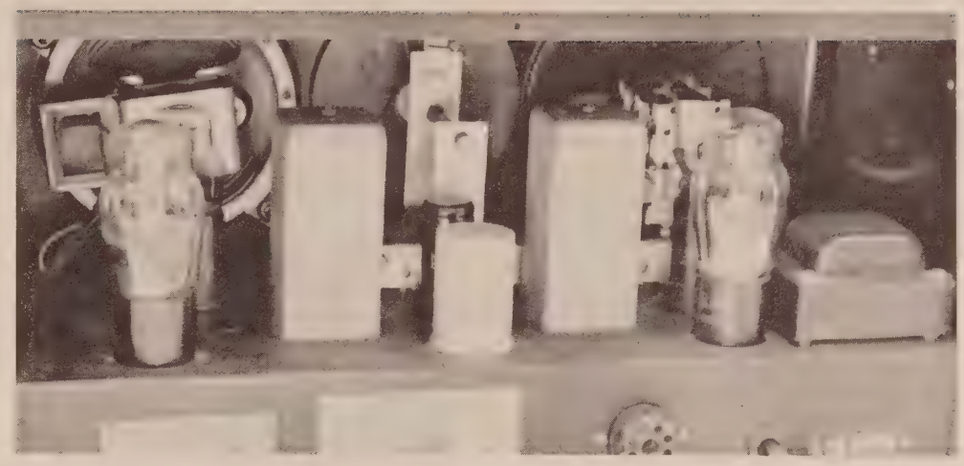
The economy was on the way up from the Great Depression. Amateur radio was exploding, the number of amateurs jumping from about 25,000 to over 40,000 in a few years. Hams in the expanding radio business were earning as much as forty dollars a week — more with overtime. At last, hams had money in their pockets and the radio manufacturers were ready for them!

How much did it cost to get on the air? Not much, if you built your own equipment. But the scorn with which most amateurs greeted their compatriots who bought their own equipment was fast vanishing. Ham gear was coming on the market and the prices were low enough to make even the most enterprising experimenter think

On the air for sixty-one dollars! In 1937 you could buy this 50-watt transmitter and four-band receiver for a real beginner's station. The three stage Lafayette transmitter worked on the 160, 80, 40 or 20 meter band with plug-in coils and could be modulated for a-m phone at 30 watts input. The Hallicrafters Sky Buddy receiver was the lowest-priced in a long line of economy receivers designed specifically for the radio amateur. Other manufacturers were quick to come out with receiver and transmitter kits as amateur radio boomed — until December 7, 1941.

twice before he built his equipment which, after all, had no resale value. There was enough business in the amateur-radio market to make it very attractive to a number of manufacturers . . . National, RME, Howard, RCA, Hammarlund, Patterson, and Hallicrafters, to name a few. The superheterodyne had at last proved itself as a sensitive and selective high-frequency receiver and amateurs were eager to buy.

Among the receiver manufacturers scrambling for the amateur market, none was more aggressive than the *Hallicrafters*, the fastest-rising star in a highly competitive field. Located in Chicago, the hub of the broadcast-receiver industry, Hallicrafters brought mass-production techniques to the manufacture of (relatively) inexpensive short-wave receivers with features that appealed to the radio amateur. While others hand-built receivers on a limited basis, Hallicrafters poured them out, backing up the production with a massive advertising effort. There was a receiver model for every purse and a receiver model for every amateur. Indeed, Hallicrafters probably had more different models on sale at one time in 1937 than the combined efforts of all the other receiver manufacturers. And the time was ripe for the "people's receiver," the *Volkswagen* of the radio industry, a receiver for the beginner — the *Hallicrafters Sky Buddy*.



Interior view of the Sky Buddy receiver. An auxiliary power plug on the rear apron allowed the receiver to be run from batteries for portable operation. The use of broadcast-receiver components permitted the rock-bottom price. Thousands of these receivers were sold to beginning radio amateurs. Shortcomings of the simple circuitry prompted many owners to "trade up" to a more sophisticated receiver as time went by.

It is often difficult to trace the exact lineage of some of the older pieces of equipment, and the Sky Buddy is no exception. For instance, the Hallicrafters Sky Buddy was first announced in mid 1936 with a frequency range of 544 kHz to 16.5 MHz. However, this may have been a typographical error, because then the set was subsequently offered through dealers in late 1936, it tuned from 545 kHz to 18.5 MHz in 3 bands. Service data, however, indicated an upper frequency limit for band 3 at 16.0 MHz!

Then, in 1938, Hallicrafters announced a new Sky Buddy in a "modern" package which was called the S-19; it had 5 tubes like its predecessor, and covered the same frequency range. This model was replaced by the "1939 Sky Buddy," designated the S-19R, which featured electrical bandspread, had 6 tubes, and tuned from 545 kHz to 44 MHz in 4 bands. This is the receiver shown in the photographs here, although its outward appearance is very similar to the earlier S-19. **Editor.**

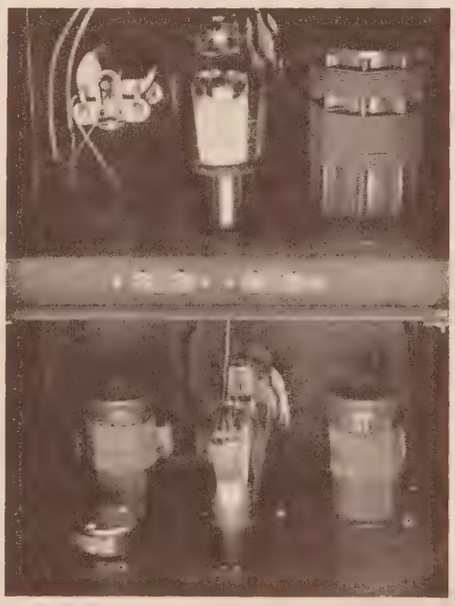
The Sky Buddy receiver

The Sky Buddy receiver was born during the summer of 1936. Based upon the popular "all-wave" broadcast-receiver circuitry popular at that time, the Sky Buddy was a re-boxed version of a basic design produced by the hundreds of thousands by a multitude of manufacturers (**Fig. 1**). No sophisticated circuitry or parts here! A simple superhet circuit, with switching added to catch "police calls" or "foreign broadcasts" on one or two extra wavebands — that was the basic design.

The first version of this little receiver was mediocre and less than a success. It tuned only up to 18.5 MHz (at a time when the 10-meter band was receiving increased attention) and had an unimpressive plastic dial and pointer. At the price of $29.50 it was no bargain. But by late 1936 the receiver had been given a face-lift. A fourth tuning range that ran up to 48 MHz had been added, the impressive "German Silver" Hallicrafters dial was an eye-catching addition, and the gain of the receiver had been boosted through the use of better i-f transformers. For $29.50 it was a lot of receiver!

Judged by today's exacting standards, the Sky Buddy was

The inner workings of the *Trutest* transmitter. On the bottom shelf are the crystal, the oscillator and buffer tubes, and the associated plug-in coils. The power amplifier is located on the top shelf. Terminals on the edge of the chassis permitted the user to make quick connections to a power supply. Since vhf television didn't exist in those days, shielding was unnecessary and all components were out in the open air. Antenna connections were made to feed through terminals on top of the cabinet.



insensitive, unstable, broad-tuning, and full of images and birdies. But for the beginning radio ham who was thrilled to hear signals from across town, the receiver was an outstanding hit! The impressive dial, plus instant bandspread and a beat-oscillator, transformed a simple broadcast set into an acceptable ham receiver that sold over 20,000 units before the model was finally dropped at the eve of World War II.

Hallicrafters had a winner, indeed. And after buying the little receiver, the amateur newcomer still had thirty-one dollars of his budget left to buy a good, husky, transmitter and power supply for his up-and-coming ham station!

The Trutest Junior transmitter

Buy or build your transmitter? In 1937 that was a difficult question to answer. Most hams built their transmitters but bought their receivers. Still, very attractive transmitters were available on the market, although no big electronic manufacturer was yet into the ham transmitter business. Small outfits like *Gross Radio*, *Temco*, and *Collins Radio* built ham transmitters but the "big-time operators" were not interested in such a small market. Nevertheless, a goodly supply of ham transmitting equipment was available for the interested buyer.

HOT SPECIALS FOR HAMS
NEW NATIONAL N.C. 101X
The NC101X incorporates most of the features of the highest priced receivers. Automatic plug-in coils, permanent calibration, micrometer dial, C.W. oscillator, crystal filter, Built-in power supply, 10" dynamic speaker $129.00
Trutest
"25 WATT JR." C.W. TRANSMITTER POWER SUPPLY
This professional-looking rig is truly a little "giant" in performance and appearance. Has the famous "Les-tet" Harmonic oscillator circuit.
RW21067 Wire and Tested, less crystal, tubes, and power supply. With one set of coils for 20, 40, 80, or 160-meter band (specify band) SPECIAL PRICE $22.50
RW21069 — Power pack, wired and tested, less tubes. $8.50
FREE
GREAT NEW SPRING CATALOG
New 116 page Spring Catalog now on the press. Send for your FREE copy now.
WHOLESALE RADIO SERVICE CO. INC.

A Wholesale Radio Service Company advertisement extolling the virtues of the *Trutest* transmitter. Few amateurs could afford the now-famous National NC-101X when it first came on the market, but sales of the Sky Buddy receiver ran high because of the value and low cost. The 1937 WRS catalog listed these, and other goodies, that made the radio hams' pulse quicken!

One of the "ham havens" near radio row in New York City was the *Wholesale Radio Service Company* at 100 Sixth Avenue (now known as Lafayette Radio Company). This live-wire store had a large amateur department run by Frank Lester, W2AMJ (now W4AMJ). Frank and his boss had strong ideas about amateur radio and the company — WRS as it was known among hams — produced and advertised a whole line of ham gear which was the talk of the ham bands until the war closed down amateur radio in 1941.

Among the unique transmitters developed by W2AMJ was the little *Trutest 25 Watt Junior* transmitter. Despite the belittling name, this was a three-stage job that operated on the 20, 40, 80, or 160 meter bands by the proper use of plug-in coils.

The circuit was simplicity itself (**Fig. 2**). A type 56 triode "hot-cathode" crystal oscillator drove a type 53 high-mu triode buffer stage. The sections of the 53 were parallel connected. This, in turn, drove a pair of type 46 tetrode tubes as a neutralized final amplifier.

The 46 was an interesting tube, and very popular in ham transmitters. It was brought out for class B audio service just about the time the radio industry dropped that type of amplifier for the much-improved "high fidelity" class AB system using low-mu type 2A3 triode tubes. The 46, in

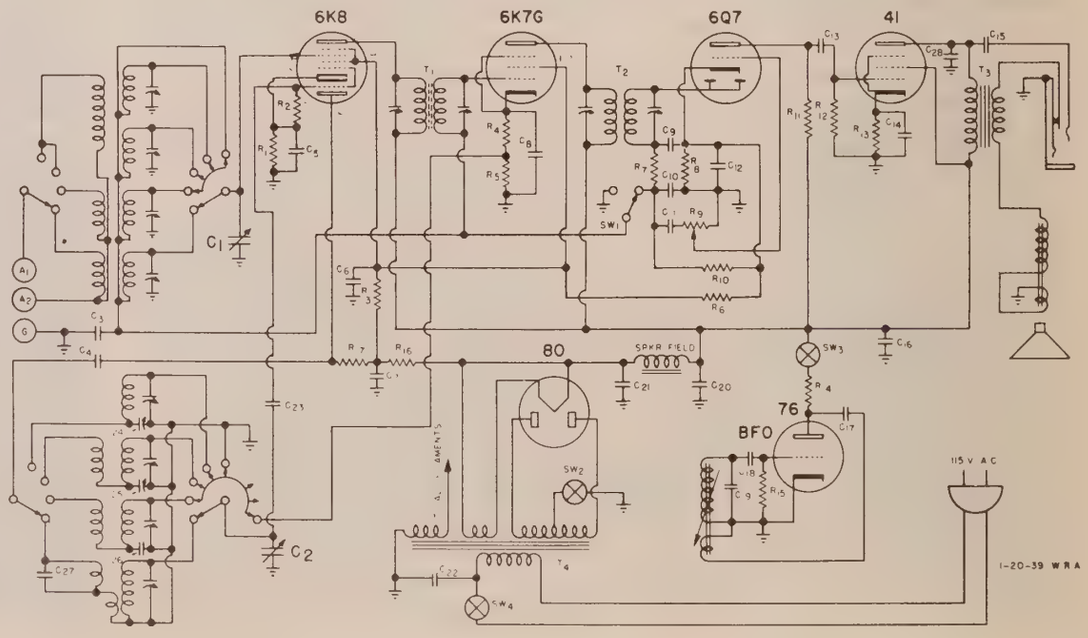


Fig. 1. The way it was — the circuit of the Sky-Buddy receiver. A dual-purpose 6K8 is used as oscillator-mixer (no rf stage!), followed by a 6K7 i-f amplifier. A 6Q7 serves as a combined second detector, avc rectifier and audio amplifier, followed by a 41 pentode audio output stage. The beat-oscillator is a 76 triode. A full-wave power supply with an 80 rectifier is used. Note that the speaker field winding is used as a filter choke — this was before the days of the highly efficient permanent-magnet speaker.

effect, was a tube without a destiny until its use in amateur service as an efficient, zero-bias, class-C amplifier was discovered. Two of these tubes could coast along at 50 watts input on CW or phone, and that wasn't bad for tubes that could be bought six for a dollar on

was a problem. Flashovers, erratic tuning, and plenty of TVI were the immediate reactions. Upon a careful examination of the circuit, it was found that the neutralizing winding of the buffer coil was incorrectly wired. Once the wiring error was corrected and parasitic

coils. A crystal cost an extra two dollars, bringing the total station expenditure to fifty-four dollars, leaving seven dollars to buy a key, build a power supply and put up an antenna. A frugal ham could even include a set of earphones for that price!

At present, the transmitter

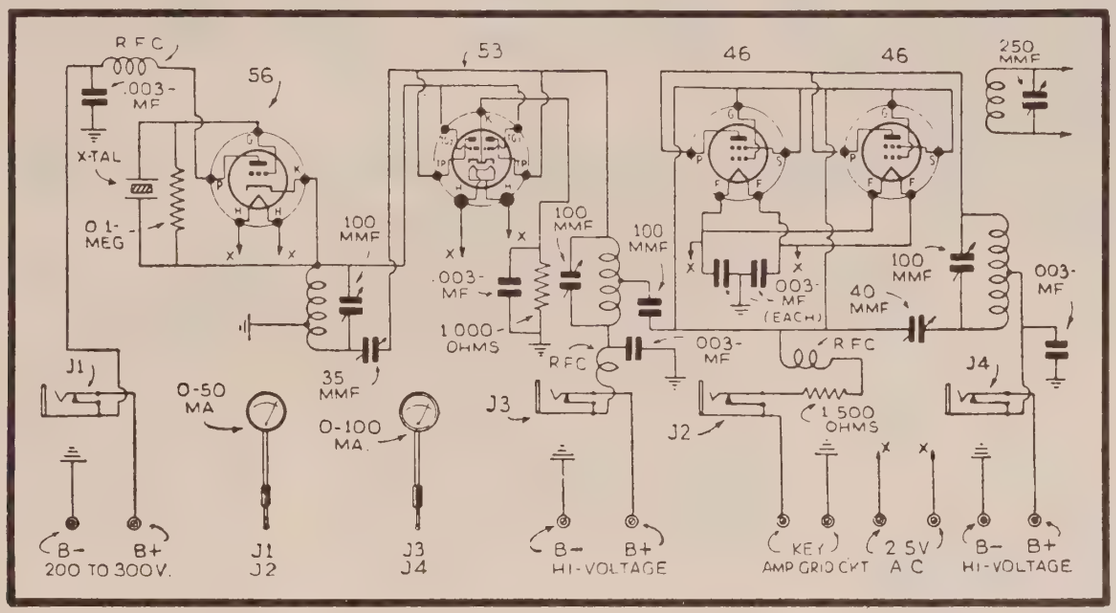


Fig. 2. Circuit of the Lafayette transmitter. Said to have a "range of 1000 miles" on 80 meters and an "unlimited" range on 40 meters, this 50-watt circuit employed three stages in a configuration unknown to most of today's newer amateurs. The 56 oscillator used the then-popular "hot-cathode circuit," with the anode of the tube at rf ground potential. (Circuit connoisseurs will note that the plate bypass capacitor for the 56 tube is missing from the drawing). The 53 dual-triode operated as either a neutralized buffer or as a doubler stage, capacitively coupled to two 46 tubes connected in parallel as a class-C amplifier. The grids of the 46s were connected together to provide high-mu, zero bias operation. Metering was done in the high voltage leads. (This drawing is reproduced from the December, 1936, issue of *Short Wave Craft* magazine, a Gernsback publication.)

radio row, or for 39¢ each via the mail order catalog.

On the air with the Sky Buddy and the Trutest transmitter

By a stroke of good luck I recently acquired a Sky Buddy receiver and a Lafayette Junior transmitter in mint condition, and immediately put them on the air to see how they would work. The Sky Buddy played well on 160 and 80 meters and was acceptable on 40 meters. While signals could be heard on the higher bands, receiver operation was unstable and erratic by today's standards. The particular model at hand, moreover, had a 500-kHz intermediate frequency and San Francisco Marine Radio KFS boomed through the i-f strip until a wavetrap put a stop to this interference.

The Lafayette transmitter

suppressors placed in the plate circuit of the final amplifier, the little transmitter settled down and put out a good TVI-free 25 watts on the lower bands, and about 15 watts on 20 meters.

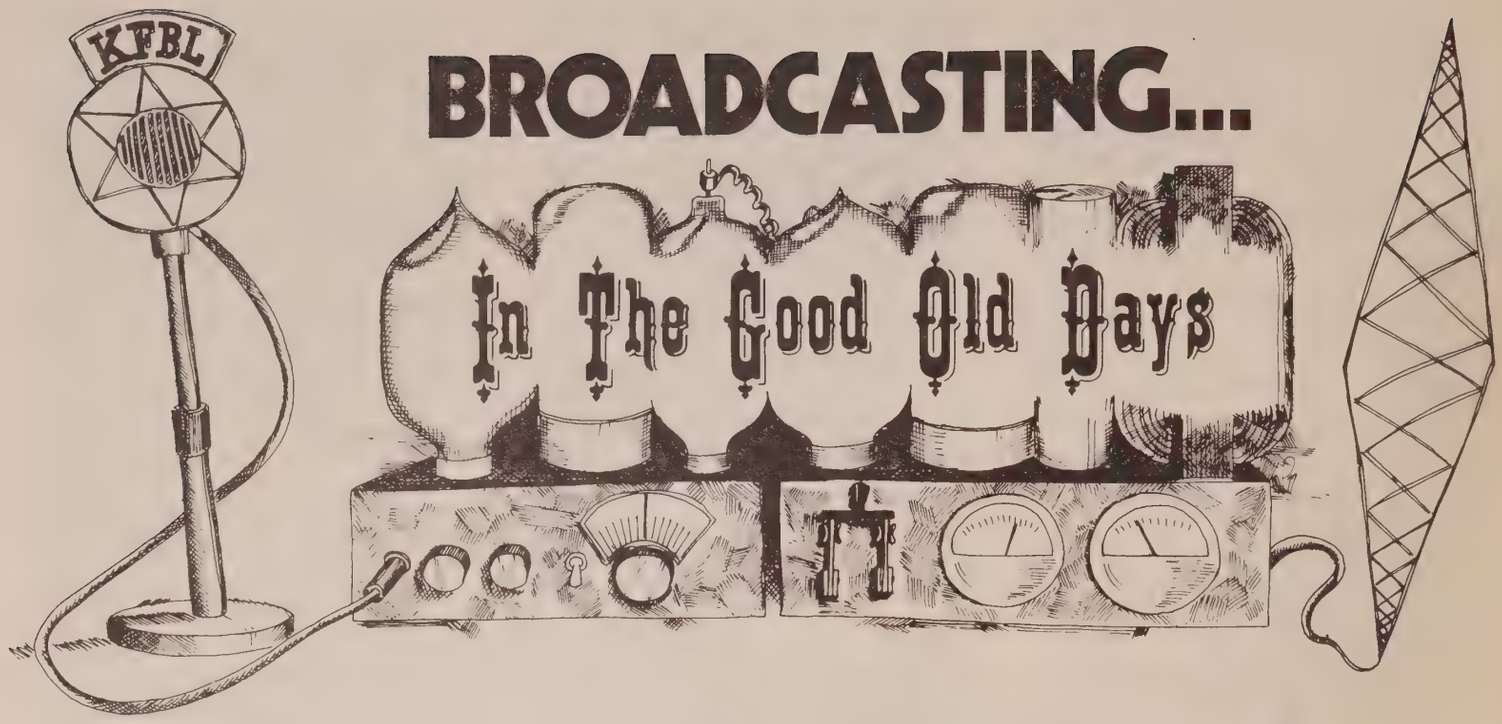
It is interesting to speculate how many of the Lafayette Junior transmitters were incorrectly wired at the factory and how many of the owners solved the problem. According to the previous owner of my rig, it had been on the air for several years and worked, even though tuning was "erratic." And no wonder! It would have taken the patience and wisdom of Solomon to tune up the beast when it was incorrectly neutralized and full of parasitics!

In any event, the beginning amateur of 1937 could buy the little transmitter for $22.50, fully wired, and with one set of

and receiver occupy a position of honor in the W6SAI shack and are ready to go on the air on special occasions. Real conversation pieces that work today, though designed over forty years ago!

So here's a toast to those forgotten circuit designers, engineers, and manufacturers of the Golden Years of Amateur Radio. Working with imperfectly understood theory in an age of sheet metal, they produced marvels of ingenuity that worked and that still draw admiring glances from today's amateurs who are possibly overwhelmed by the modern world of plastics, ICs, counters, and LED readouts that insulate the operator from the "feel" of the airwaves. Could you or I do as well today with the tools and techniques of yesterday? I wonder . . .

HRH



BY BOB BAIRD, W7CSD

When I was about fourteen years old, I visited radio station KFBL in Everett, Washington. The old broadcast station was located on the second floor of a 1900-vintage building whose first floor was occupied by Leese Brothers Radio Sales and Service. The Leese Brothers owned the shop, the radio station, and — presumably — the building, although I can't say for sure. This probably accounted for the "BL" of KFBL, standing for "Brothers Leese".

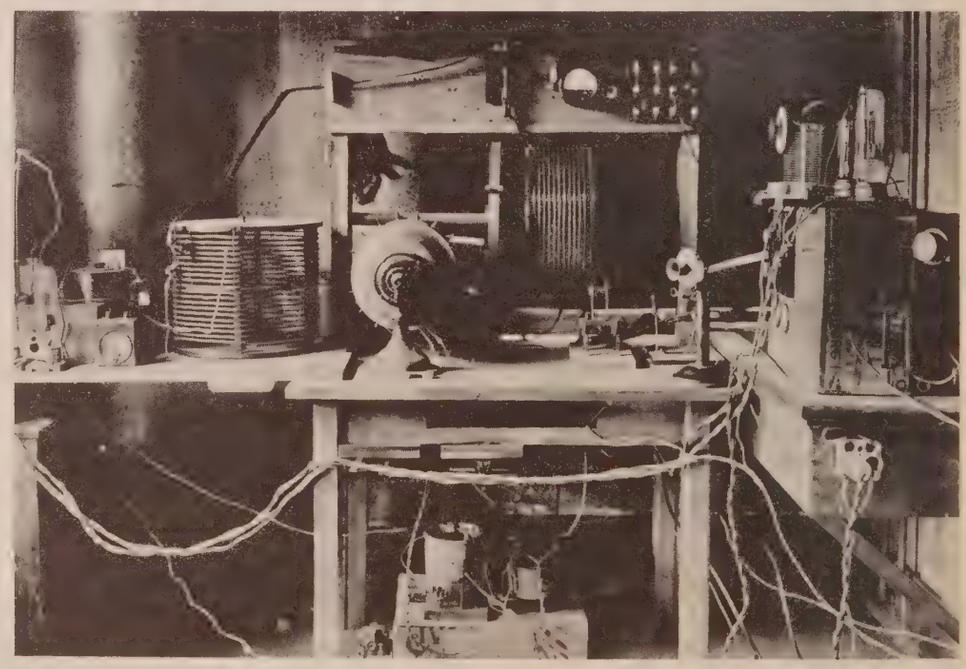
The station was started way back at the dawn of commercial radio broadcasting in 1922 or 1923 and, from what I have been told, a 1000-volt storage battery was used for the power supply. This probably was true, because when I visited there the old open-blade knife switches mounted on slate panels were very much in evidence.

Eventually the station came under new ownership and management, and acquired the call letters KRKO. In 1934, with a brand-new First Class Radiotelephone license in my pocket, I began my career with KRKO as a part-time operator, disc jockey, announcer, and general factotum. My license, incidentally, was printed on white paper (not the familiar blue paper that appeared later) and bore the name *Federal Radio Commission*, which had been crossed out and replaced by the words *Federal Communications Commission* neatly typed in above the old letters.

By 1934, the Leese Brothers' radio shop had been replaced by the Log Cabin Beer Parlor. In the concrete sidewalk outside the big double doors leading up to the station, were brass letters that boldly stated ST. JAMES HOTEL. These had come from an earlier, and perhaps kinder, era, although part of the upper floor of the old building sometimes served as sort of a hotel — when it was not empty!

At the top of the creaky wooden stairs, visitors turned

In the four years before KDKA went on the air in 1920, Dr. Frank Conrad, Assistant Chief Engineer of Westinghouse, used this transmitter to send out radio telephone programs. Located on the second floor of a garage at the rear of his home in Wilkinsburg, Pennsylvania, the transmitter was station 8XK — one of the forerunners of modern radio (*photo courtesy KDKA*).



right into the part of the building that housed the station. If someone mistakenly turned *left* at the top of the stairs — as occasionally happened — he might be embarrassed to find himself in an empty building, or a hotel occupied by guests, depending upon the month and year.

The station occupied three rooms opening on a hall. The back room housed the transmitter, control room, announcer's booth, and record-playing equipment. The center room was a live-program studio lined with heavy drapes for sound-proofing and echo-suppression, and the front room was a combination record library and business office. There was no plumbing in the radio station, so any station employee who might have need of same quickly placed a 15-minute transcription of *Ted Rio Rita* on the turntable and dashed downstairs to the beer parlor.

The station antenna was a 60-foot flat top strung above the roof between two-poles located at opposite ends of the building, and the "ground" system was a scramble of wires (counterpoise) lying on the roof.

Equipment

The station had a rated power output of 50 watts. Its transmitter consisted of a crystal oscillator using a type 210 tube, a buffer stage using another 210 tube, and a final amplifier consisting of a pair of tin-plate 203A tubes, modulated by a 212D tube in a Heising circuit. All of this was mounted behind three panels, some slate and some bakelite, each about 6 feet (1.8 meters) high and 2 feet (60cm) wide. There were two other similar panels. Part of one panel held a frequency monitor and a broadcast receiver, while the other was full of unused knife switches and switchboard meters of a by-gone era.

Aeriola Jr. was the first popular-priced home radio receiver. This tiny crystal set, designed by KDKA engineers in 1921, employed earphones, had a range of 12-15 miles (19-25km) and sold for $25. At last there was a set simple enough to be operated by non-technical fans and inexpensive enough to be afforded by every household (*photo courtesy KDKA*).

A separate steel-and-wire cage held the power supply which consisted of a mercury-arc rectifier and associated oil-bath container.

The control table held two old-style hysteresis, aluminum-disc-type, 78 rpm phonograph motors and Audak pickups with quarter-pound (0.55kg) "wrist action" heads. These used steel needles that had to be changed for every record. An audio-mixing board (made of wood) was mounted directly above the control table, and the announcer's carbon mike was suspended on several lengths of water pipe and an elbow or two.

The audio equipment itself was mounted in a wooden box under the table and, as I recall, consisted of a single 271A tube whose output was fed across the room to the transmitter modulator. Two 16-inch (41cm) transcription tables, driven by 1/3 horsepower motors and a worm gear box, were mounted on cast-iron pedestals. One of these did not work.

The studio contained a piano

Glossary of Terms

Heising Modulation is an inexpensive modulation system named for its inventor. The plate of an audio tube is connected to the plate of an rf tube through a large coil (transformer winding) and both are connected to a common high-voltage power supply. The varying audio signal causes the plate voltage to vary and thereby modulates the rf carrier.

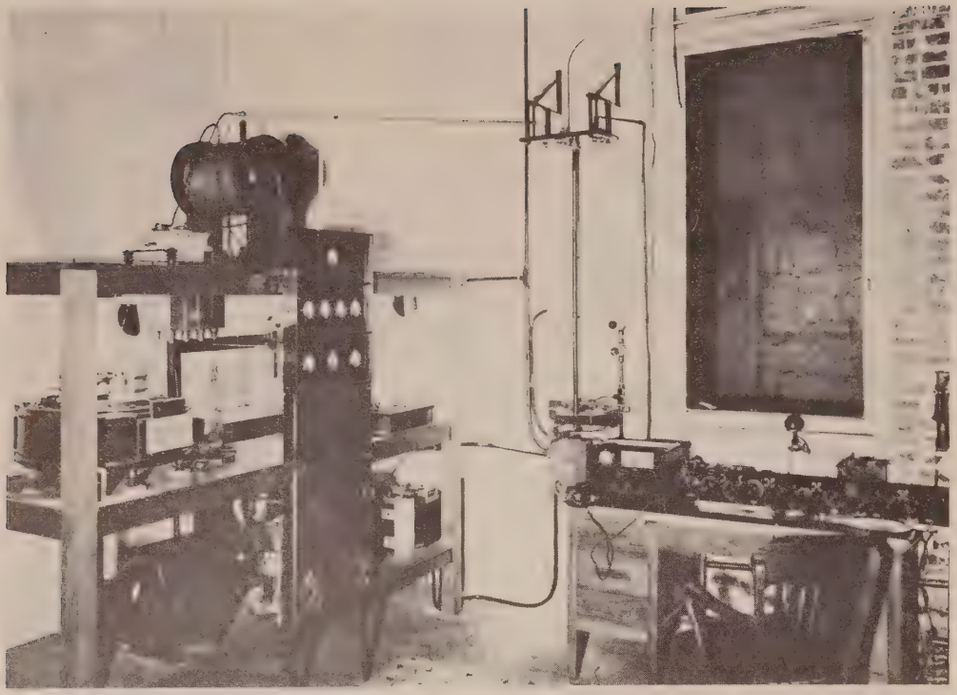
Mercury-Arc Rectifier is a glass bottle, or tube, containing metallic mercury which, when heated, vaporizes and ionizes under application of high voltage. The ionized gas conducts current from one plate to the other of the two-plate (diode) tube.

Hysteresis Motor is a synchronous motor that operates without poles or dc excitation because of losses in the magnetic material of its coils produced by a rotating magnetic field.

Carbon Mike is a microphone containing tightly-packed grains of carbon which, when vibrated by sound waves, change their electrical resistance and — hence — current flowing through them, at an audio rate. The changing current is applied to the audio amplifier to produce modulation.

Y-Cut Crystal is a quartz crystal that is cut so that its major faces are perpendicular to the Y axis of the natural crystal. When voltage is applied across these faces, the crystal vibrates at a frequency depending upon its thickness.

Condenser Microphone is also called a capacitor or electrostatic microphone. Two thin plates, separated by an insulating material, such as air, are caused to vibrate by sound waves. The vibrations cause changes in the electrostatic field between the plates when voltage is applied to them. The changing field causes a change in current flow, which is then applied to a modulator tube or stage.



Typical transmitter and control room of an early broadcast station, circa 1923. Notice the large antenna-loading coil and the operator's console — a far cry from today's stations.

and a good Remler condenser microphone with a preamplifier. There was a monitor speaker and amplifier hooked into the system somewhere. Modulation meters had not yet been thought of, and oscilloscopes were in their infancy, so the modulation indicator was a piece of neon tubing mounted on top of the front panel of the transmitter and connected to the final amplifier stage. If it flickered under modulation, we were in business! And that, dear reader, is all we had!

Opening procedure

The first thing we did every morning was to take a dart, made from a steel pen-point, a match, and a paper tail, out of one wall of the control room and throw it at the opposite wall. If we did not do this, the station would be certain to go off the air sometime during that day. Honest Injun!

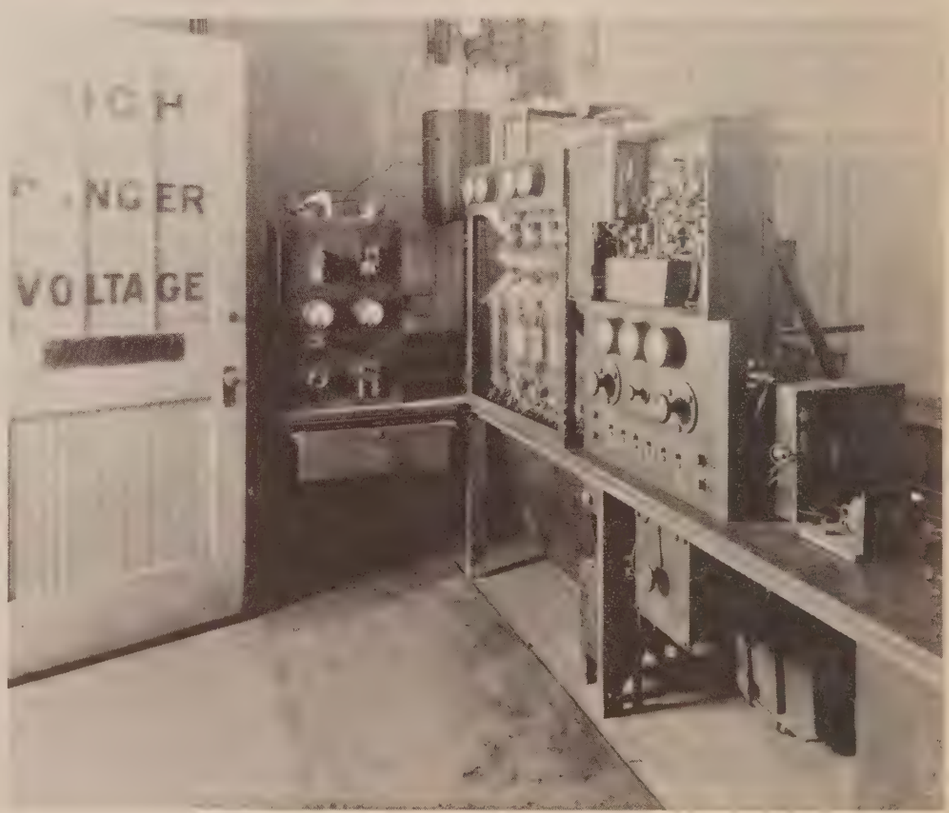
The second thing we did was turn on all the filaments and, after a few seconds, turn on the power. This did not fire up the final amplifier, however. To do that, we had to rock the mercury-arc rectifier back and forth to establish the arc, and then push another switch. If we were lucky, about 1500 volts would be delivered to the Heising modulator, and the remainder of about 800 volts would be fed to the final amplifier stage. Next, we had to adjust the oscillator frequency by turning the tuning knob or, if worse came to worse, we had to readjust the thermostat of the crystal oven; and thereby hangs a tale.

The red light episode

To begin with, the crystal oscillator in that old bucket of bolts was *battery* biased. "This cannot be," you say? That's right, it couldn't be, but it was! It would never begin oscillating by itself, but with the buffer connected it would oscillate — and did, every day. Just to see what would happen, I disconnected the buffer one day, and the oscillator did not "take off." Normally, the buffer was powered at the same time as the oscillator, so everything worked when we turned it on.

An unusual feature of this particular circuit was that the oscillator would perform, regardless of where the tuned circuit resonated, and we could shift the frequency by several hundred cycles (Hertz) just by turning the knob of the plate-

This was the original transmitter room used to broadcast KDKA's famous Harding-Cox Election results on November 2, 1920. It was located in East Pittsburgh, Pennsylvania (*photo courtesy KDKA*).

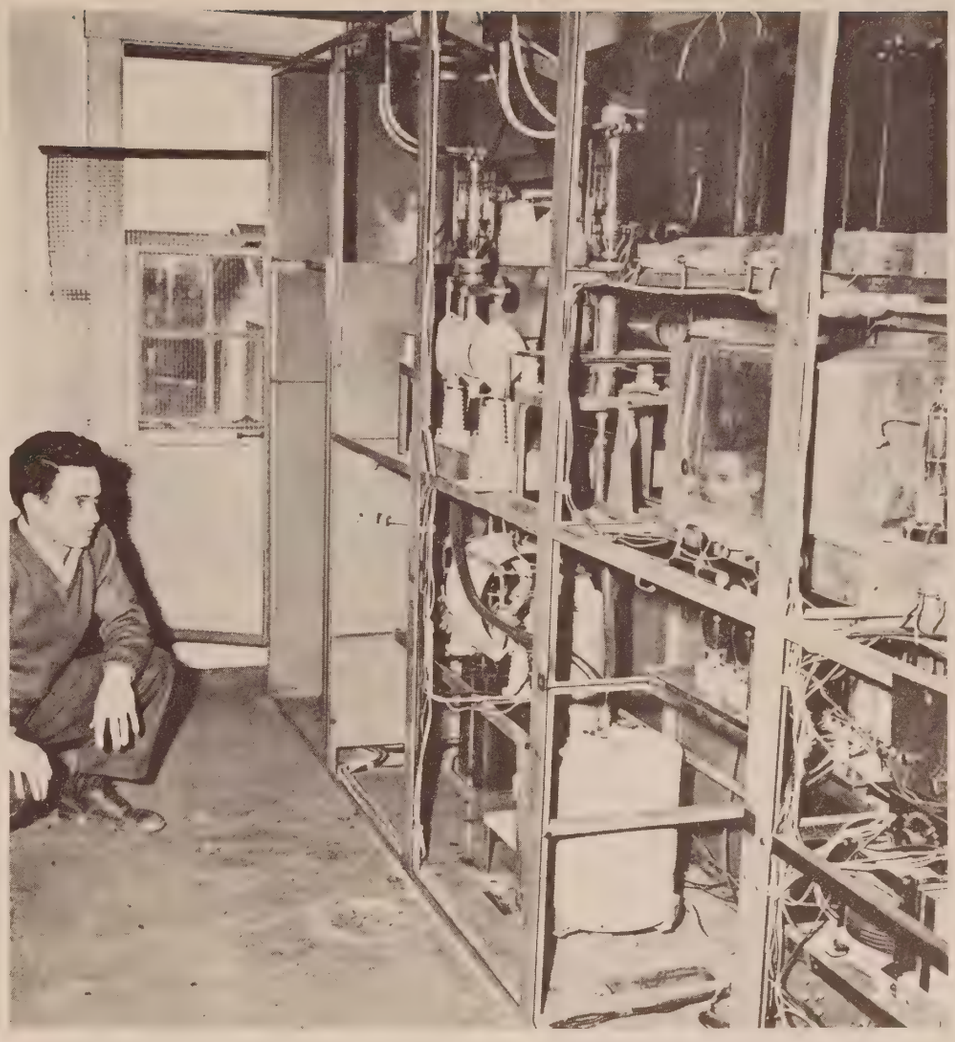


tank capacitor (we called them condensers in those days). I suspect that was the reason for the battery bias — to help stability. Incidentally, there were absolutely no circuit diagrams of anything in the station!

In those years, the FCC required that the transmitter output frequency be within 50 Hz of the station's assigned frequency. The oscillator crystal was Y-cut, with one corner chipped off, which made it very temperature sensitive. The crystal oven had been made from an old "B-eliminator" case lined with asbestos and heated by two 25-watt light bulbs. The thermostat was a piece of hard rubber on a threaded shaft having a contact on one end. When the hard rubber expanded, the movable contact at the end of the rod touched a fixed contact which actuated a relay, and turned the lights off. By adjusting the threaded shaft, we could set the oven for a particular temperature.

In this way, by adjusting temperature and observing frequency regulation, we could finally achieve the proper setting to place our output frequency within the permitted plus or minus 50-Hz tolerance.

Now the joker in all of this is that one of the bulbs in the temperature control box (crystal oven) was white, and the other, red. I had been warned that if the red bulb should ever go out, I was to run down immediately to the drug store and get another. Well, eventually the red bulb did burn out, but I didn't go to the drug store; I merely replaced the red bulb with a spare white one that was at hand. In a couple of hours, I had the transmitter frequency stabilized to within about 10 Hz. The next morning, we were off by about 200 Hz, so I adjusted everything again. The second morning, same song — second verse, and it just repeated the same thing all week. Finally, I got another red bulb, replaced the white one, made one more adjustment, and had no trouble for months! Spooks? Maybe so.



The more elaborate, high-power stations used built-in cabinets and racks to hold the power supply components, including a huge transformer, shown at the bottom of the picture in front of the operator. Note the high-voltage leads at the top, connected to the rectifier tubes. Definitely a "kluge" today, but the "last word" in the 1920s and early 1930s.

The mercury vapor episode

The mercury-arc rectifier consisted of a gargantuan glass bulb with two "arms" protruding at the sides. The center portion of KRKO's rectifier was about 4 inches (10cm) in diameter, and stood about a foot (30cm) high. The "arms" were each about 2 inches (5cm) in diameter, and curved outwardly and upwardly away from the body of the tube. At the end of each arm was an anode (high-voltage) contact.

I never really liked this monster very well, and I observed that if it should ever blow up, the control room would be a very unhealthy place; breathing mercury vapor can be lethal! So, as you might expect, one dark night it went — *Kapow*! *Klink*! I held my breath, rushed out to fresh air, and — in about ten minutes — came back in. All was silent and dark; broadcasting was at an end for that evening.

It was immediately decided that the mercury-arc rectifier had to go, never to return. So, late that same night, we managed to scrounge a couple of 866 tubes and a filament transformer from a local ham, and we were back on the air in the morning with our re-vitalized power supply.

I poured the mercury out of the broken rectifier bottle into an empty "Coke" glass, nearly filling it. I estimate that this amounted to about 5 pounds

A soloist was expected to ignore the "Silence" sign in this 1925 KDKA studio located at a Westinghouse building in East Pittsburgh. The studio was amply padded to help subdue any unwanted sounds during the early live broadcasts (*photo courtesy KDKA*).

(2.3kg) of mercury. I placed the glass — full of mercury — on the floor of the studio, next to the couch. Now, in those days, we had a newsman at the station whose normal blood-alcohol content approached 30 per cent. The next day I found him lying on the couch with a tall drink of some kind placed on the floor, only a short distance away from the glass of mercury. He was in no condition to tell which was which and, although I'm sure that he could have never raised that 5 pounds of mercury to his mouth, I did remove it with great speed!

The case of the open-blade knife switch

As I've already mentioned, there was one panel full of unused switches and meters. There was even one spring-loaded knife switch, good for 500 amps. On the front panel of the section containing the modulator and final amplifier was a real live knife switch in series with the 1500 volts B+. Needless to say, that open-bladed switch was hotter than a firecracker, and everybody knew it. Nevertheless, it was common practice to open the switch just slightly, thereby establishing an arc to light a piece of paper. Having lit the paper, it was possible to light a cigarette without the aid of a match; and it seemed that operators and announcers were always without matches.

Well, one bright day, the Radio Inspector came along and inquired about this knife switch, wondering what it was doing on the front panel. When informed it was in the high voltage lead, he immediately wrote out a citation. Solution: The operator-in-charge took the knife switch and mounted it behind the front panel in the same holes, but with only the bare bolts showing. It's always better to be safe than sorry!

The case of the burned out heising resistor

One day, the Heising "dropping" resistor burned out, and the duty operator called me on the phone for help. By the time I got there, he was trying to measure the resistance of the pieces of the resistor with an ohmmeter. He said, "The resistor wasn't labeled and I can't figure out what the values of the broken pieces are." (My observation is that this is the level of a lot of present-day holders of First Class Radio Telephone licenses.) I said, "The input was 1500 volts, and we delivered 800 volts to the final. That gives a drop of 700 volts at a plate current of 125 milliamps. Unless Ohm's law has been repealed, we need 700 divided by 0.125, which equals about 5600 ohms." So we went down and bought a 5000-ohm, 100-watt resistor and got back on the air in about an hour.

The phantom of the organ

Much has been written about slips of the tongue that have gotten out thru a supposedly turned-off mike. I don't recall anything worse than, "Hey, Pat, where's my cigarettes?" We did get a buxom soprano, who had to stand back three feet from the mike to keep from overloading it, on the air one time. The wall was paper thin, anyway, and the announcer forgot to turn off the "announce" mike. About the time this babe got wound up, the announcer leaned back and said into the announce mike, "Home to the laundry lady, home to the laundry." This was a bit of a sticky wicket.

But the one that amused me the most was the drunk on the *Phantom of the Organ* program. Several times a week after the last show, we put on an organ-music program from one of the local theaters. We called it *The Phantom of the Organ*, and it really was fun to climb down inside the orchestra pit and watch this old boy perform. The organ was a three-keyboard job with forty-'leven tabs on it, and the old gent could really make it talk.

We would place the Remler condenser mike right in front of the first row of seats in the theater and, for that day and age, it did a remarkable job. One night, the announcer put the show on the air and then climbed down into the pit to watch the organist. But, after the show, an inebriate had failed to leave the theater. Just in between numbers when the music was very soft, he got up in front of the mike and said: "Shay, mishter, will you play

I Love You Truly for my wife at home?"

The barter system

A 50-watt station in competition with other stations 25 miles away had a pretty rough time in the middle of the Depression. Cash was hard to come by. To stay alive at all, it was necessary to sell "time" paid for in trade. The power and telephone bills were paid by advertising. I never got a paycheck in cash, but received cords of wood, suits of clothes, typewriters, and permanent waves for my mother. I tried to get a diamond engagement ring for my wife-to-be one time, but that was too hard to negotiate.

At the time I left, there were hundreds of dollars-worth of laundry or dry-cleaning credit; consequently nobody did their own wash. The manager's wife was getting a fur coat and a grand piano, but they didn't have enough groceries. The church and the local mortuary were outstanding cash accounts. Nobody would be paid off in sermons or caskets!

We had a paunchy cowboy singer who hocked his guitar to buy a marriage license. He didn't have any money to pay the preacher, but he knew the preacher to be an avid fisherman. So, several weeks later he got a nice fishing pole in payment on an account, and took it over to the preacher in return for his services. Operating on the barter system was a real headache!

One of the local hams became quite interested in building a condenser mike. He was very successful; in fact, the station bought the mike from him and suspended it with salt water fishline from the ceiling and walls in the control room, thus retiring our old WE 387W carbon mike. But hereby hangs a tale . . .

In the Puget Sound area the humidity gets pretty high, and the spacing between the stretched-aluminum diaphram and the back plate of a capacitor head on such a mike is only a few thousandths of an inch. Also, the potential difference between the two surfaces is several hundred volts, dc. Well, when the weather got a bit wet, the thing would arc over. Several cures were tried, but a thin rubber membrane stretched over the back plate finally did the job.

Besides the Remler condenser mike there was one really good piece of equipment in the station: An International frequency monitor, the grand-daddy of modern counters. It started out with a temperature-controlled 50-kHz quartz bar which drove either some kind of a multivibrator or blocking oscillator that produced markers every ten kilohertz, the full length of the broadcast band. For normal operation, a short pick-up antenna was placed near the transmitter, the dial tuned to the proper frequency, and the frequency deviation observed directly from a meter.

In conjunction with a TRF receiver, we had an old three-dial tuner; a Grebe, with the Chinaman on the front panel. You could stuff the frequency meter antenna inside the Grebe's detector coil, tune in stations as much as a hundred miles away, and read out their deviation. This was very helpful to neighboring stations that had frequency-meter troubles. It was the only one of these I have ever seen, but it was a Jim Dandy.

DX in the broadcast band

You wouldn't expect to get many DX reports with 50 watts on 1370 kHz, but, when we did, I expect the horizontal antenna was responsible. Each month we made a 20-minute frequency check with a monitoring station at about two o'clock in the morning. Almost invariably we received a letter from someone in New Zealand, giving the names of the records we had played and requesting an acknowledgement card. **HRH**

This tent atop the Westinghouse K building in East Pittsburgh, Pennsylvania, was KDKA's first studio. It was the cause of some of early radio's "rare" moments, like the whistle of a passing freight train heard nightly at 8:30 PM. A tenor's aria was once abruptly concluded when an insect flew into his mouth. This make-shift studio remained in use until late 1921 (*photo courtesy KDKA*).

Author's note:

The events and equipment I describe are as I remember them and are indeed true, to the best of my knowledge. Most of the incidents were either personally observed, or related by others of earlier experience. I presume them to be reasonably accurate.

those GOOD OL' RADIO magazines

BY JOHN J. NAGLE, K4KJ

Nostalgia buffs fondly recall the "Good Old Days"

. . . memories . . .
ntains of surplus
up" on radio row;
iar names: Gonsett,
dom, Reinartz,
amb, McMurdo
sights and sounds of
HRO, an MB-29, a HQ-120, a
Super Skyrider; crisp pages in the latest copy of *Radio, Amateur Radio Review*, and *The Transmitter* ; share these, and more, on a nostalgic ramble through the pages of . . . those old radio mags.

Last weekend I was repainting the family room and needed to move the children's old train table out of the corner. At first I could not budge it, but, looking under the table, I saw the problem was several very heavy boxes. "What," I wondered, "has my wife stashed away here?" So I opened them up and was I surprised: they contained *my* collection of old radio magazines!

I couldn't resist a peek. I reached into the nearest box and hauled out old *QSTs*, some with red covers, some with plain covers, and some with picture covers; a large assortment of *Radio* magazines, also known as the "West Coast QST;" and all-too-few issues of *Amateur Radio Defense*. There was a copy of *CQ* dated April, 1931 (no connection with the present *CQ*) published for commercial radio operators.

Did you realize that there were two different *73s*, neither of which was any relation to the present *73*? One issue, dated May, 1932, was published by the United Radio Operator's Association in Portland, Oregon; a commercial operator's magazine. Another *73* was the official publication of the Federation of Radio Clubs of the Southwest ARRL. Seems kind of strange to read an issue of *73* that wholeheartedly supports the League, like a Hatfield going to bat for a McCoy.

I turned up another magazine called *The Transmitter* dated October, 1926, and two issues of *Amateur Radio Review* from the early 1930s, both with the NRA eagle on the front cover: "We do our part."

And here were a few *R/9s. R/9* was always a first-rate technical magazine. When *R/9* and *Radio* merged in 1936, the result was a really top-notch product, and a worthy competitor in the field.

There was an swl magazine called *RADEX* (stands for *RA*dio In*DEX*). In it, my eye fell on one item sent in by a reader that KNHI, Alcatraz Island, tests every morning on 2160 kc with the U. S. Coast Guard! Verification was signed by the Warden. Apparently it was easier to get a QSL card out of Alcatraz than a weekend pass.

The next box held some early handbooks, some pamphlets by James Millen and some by Frank Jones. I couldn't help myself: I forgot the paint brush, lit up my pipe, sat down on the floor, and, as I leafed through these old treasures, returned to my boyhood . . .

In skimming through the old

In addition to the well-known, nationally distributed amateur magazines like *QST* and *RADIO*, there were numerous publications intended for a local audience. *Amateur Radio* was published in New York in the 1920s; it combined with *Radio Relays*, a Boston magazine, in June, 1924. William Halligan, who later founded Hallicrafters, was the editor of *Radio Relays*. *Ye Brass Pounder* (opposite page) was a four-page newspaper style publication produced in New York around 1930. *Midwest Radio* was published in St. Louis in the 1920s for amateurs in the ninth call area (now the tenth call area). *Modern Radio* was published in Connecticut in the early 1930s; *R/9* was published in Southern California between 1933 and 1936 — both were eventually absorbed by *RADIO*.

Hallicrafters Sky Buddy receiver from about 1940. This receiver had no rf amplifier, only one stage of i-f, a built-in speaker, and electrical bandspread, but for $29.50 it was a lot of radio. As a junior high school student K4KJ worked in the school cafeteria almost a full semester to buy one! (*photo by K4KJ*).

magazines, I gleaned several bits of miscellaneous information that in my 37 years in radio I hadn't known before. I feel the urge to pass these on to the unwary in the form of questions, lest this information become lost to posterity forever.

1. In the late 1920s and early 1930s the National Company made a couple of models of receivers called the MB-29 and the MB-30. What does "MB" stand for?

2. Over the years Hammarlund manufactured a series of receivers known as the HQ-120, HQ-129, HQ-170, HQ-180, etc. What does "HQ" stand for?

3. What is the difference between a heterodyne type receiver and a superheterodyne type receiver? Hint: What is the difference between an autodyne and heterodyne type receiver?

Watch for the answers to these important questions which I will try to work in during the course of the article.

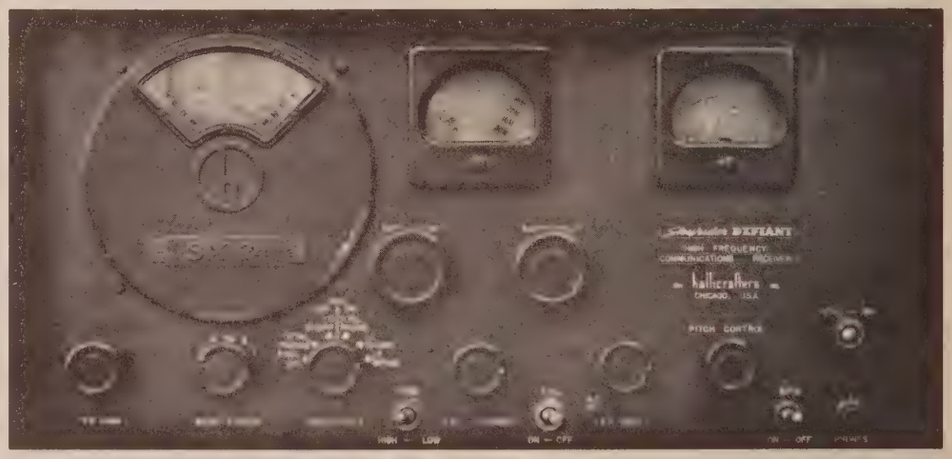
Authors

I was interested to read the tables of contents of these magazines and note the authors: names like W. W. Smith, Ray Dawley, and Frank Jones; John Kraus, also Faust Gonsett (later shortened to "Gonset"), Herb Becker; E. H. Conklin who, with his wife, Josephine, always seemed to be going somewhere; Charles Perrine, John Griggs, Dawkins Espey, J. N. A. Hawkins (who also wrote as "Jayenay"), and Clayton Bane, F. D. Wells, Robert Kruse, Boyd Phelps, McMurdo Silver, George Grammer, James Lamb, Don Mix, John Reinartz, and Byron Goodman — all these names and many more.

I can't resist philosophizing a little about these names. The tremendous expansion in electronics in the last 30 years or so really began with the intensive use of electronics during World War II. Outside of the telephone and broadcasting industries, there were very few people trained in electronics except for Amateur Radio operators; and most Amateurs, in those days, learned their electronics by reading these authors. I believe that the electronics industry today owes a lot more to these men than it can ever repay . . . or is even aware of.

In the Small World Department, while this is being written, the May, 1976, issue of *ham radio* arrived with an article by the same E. H. Conklin in which he makes a very flattering comment about a previous article I had written. I can't help but return the compliment, for Conklin's article proves that the early radio writers can also compete in today's market place. They certainly have a wealth of background that would be helpful to the modern generation.

One of the most prolific technical writers of the time was Frank Jones. The earliest article of his of which I am aware appeared in the May, 1929, *Radio* on "Detector Circuit Design Problems," although it may not have been his first article. I visited Frank two or three years ago, and he took me out to his radio room. What a sight! I wish my wife could have seen it; she would appreciate my own modest



Hallicrafters Skyrider Defiant was also known as the SX-24. It had one rf stage, two i-f stages, a crystal filter, S-meter, and sold for $69.50 (plus external speaker). One of the features of the receiver was its *Frequency Meter Tuning* system — when the main tuning dial was set to an appropriate index, the bandspread dial was accurately calibrated and could be used as a frequency meter. K4KJ claims that the one he owned was "dead accurate" (*photo by K4KJ*).

shack. It was a homebrewer's delight. Outside of some commercial test equipment, *everything* was homemade! Gear was spread over the operating table, over a side table, and up the walls. Frank had to rearrange a lot of stuff just to find me an empty chair. I think it should be preserved in its present state in some radio museum. No hurry, though, Frank!

Interestingly, much of his equipment appeared to be transistorized. Apparently, Frank is one of the few oldtimers who has made the transition from vacuum tubes to solid state. I hope we will have some more articles from him, soon.

Goodies For Sale

After reviewing the tables of contents, I moved into an easy chair and turned to the advertisements . . . which proved equally fascinating. The first ad to catch my eye was a small two-inch ad in, the May, 1934 *QST* that announced that one Robert Henry, W9ARA, of Butler, Missouri, a graduate of the Massachusetts Institute of Technology in electrical engineering, offers to sell the latest factory-made short-wave receivers — on easy terms, too. He was doing business as Henry's Radio Shop then.

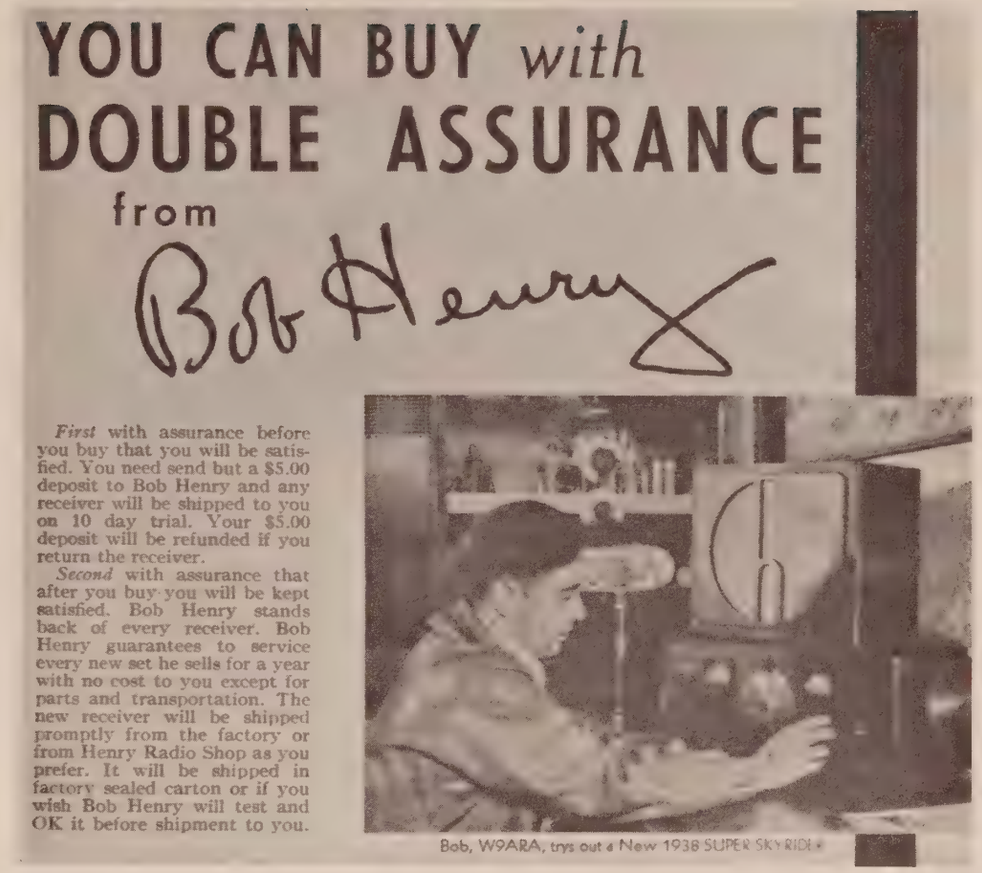
I often wondered how a graduate in electrical engineering from MIT could find happiness selling short-wave receivers by mail order on easy terms from a small town in western Missouri. I hope he did, for he's been doing it now for over 40 years, and doing very well at it. In May, 1935, Bob advertised the new Hallicrafters S-9 receiver, which tuned from 550 to 18,000 kcs (they didn't use Hz in those days). It featured a built-in speaker and nine all-metal tubes, the latest thing, then, in the tube business. It was only $69.50 on easy terms. If you have any left, Bob, I'll pay the full cash price, and not trade-in either!

Another ad that caught my eye was by Bill Harrison, W2AVA, in the December, 1935, issue of *Radio*. Bill was offering genuine Western Electric 211Ds for $4.90 (regular price, $17.50) brand new. How many amateurs today use Western Electric tubes in their transmitters? How many even know what a 211D is? If you have any left, Bill, I'll bet you can sell them to the collectors without any trouble at all.

I always enjoyed visiting Harrison Radio, both before the war as a boy and also later on during my annual pilgrimage to New York for the IRE Convention in March. Harrison always had the largest displays of secondhand equipment I have ever seen. It would take me the best part of an hour just to twist all the knobs. That stuff would go like hot cakes at an Antique Wireless Association convention today.

Thinking of Bill Harrison brings back other pleasant memories, too. His old store on West Broadway was just a few blocks from that "radio heaven" known as Cortlandt Street. On school holidays I would take the Liberty Street ferry from New Jersey, walk down a block, and then work my way up the east side of Heaven, visiting the stores one by one. By the time I got to the end of radio row, I was usually broke; so I would continue on up to Broadway where my father had his office. I could generally talk the OM out of an advance on the next lawn mowing or car washing job. Then I'd proceed down the *west* side of Heaven.

Cortlandt Street radio stores were real radio stores, too. A big pile of odds and ends in front of a store advertised as "Today's Special," had probably been Today's Special for the last six months. Some of it looked as if it was also Tonight's Special; (they didn't bother to take it in at night either). Often there'd be several bushel baskets of old glass-type tubes piled in front,

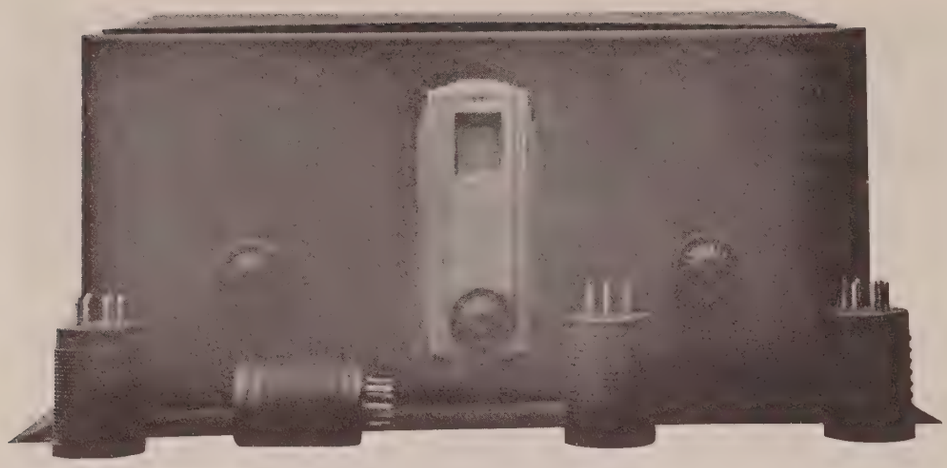

YOU CAN BUY *with*
DOUBLE ASSURANCE
from
Bob Henry

First with assurance before you buy that you will be satisfied. You need send but a $5.00 deposit to Bob Henry and any receiver will be shipped to you on 10 day trial. Your $5.00 deposit will be refunded if you return the receiver.

Second with assurance that after you buy you will be kept satisfied. Bob Henry stands back of every receiver. Bob Henry guarantees to service every new set he sells for a year with no cost to you except for parts and transportation. The new receiver will be shipped promptly from the factory or from Henry Radio Shop as you prefer. It will be shipped in factory sealed carton or if you wish Bob Henry will test and OK it before shipment to you.

Bob, W9ARA, trys out a New 1938 SUPER SKYRIDER

Bob Henry must be as good an operator as he is a businessman — he won the DX phone contest in 1937. This photograph was featured extensively in Hallicrafters advertising for their 1938 Super Skyrider in late 1937.



The National SW-5 was one of the first ac powered all-band shortwave receivers. It preceded the famous SW-3 and was designed for shortwave listening, which was very popular in the early 1930s. The SW-5 used plug-in coils and required an external power supply and loudspeaker; the receiver had one stage of rf amplification, a regenerative detector, and three stages of audio with a push-pull output stage to drive the loudspeaker (*photo by K4KJ*).

"Guaranteed to light, 5 cents each." No guarantee on the emission capabilities; just guaranteed to light. You wouldn't have to look very far to find the tube type you needed; the older the type, the easier it was to find. I could really use a store like that today: I'm trying to restore an old National AGS and am having trouble with numbers like 35, 37 and 89 . . . among others.

Inside the store there was inevitably a bargain table right by the front door; around the walls, and in the back of the store, the stuff was piled to the ceiling. There were some stores where it was handy to bring a flashlight. The wooden floor creaked and groaned when you walked, and they hadn't been swept in months, or maybe even years. Dust was everywhere, but you could usually find whatever you wanted, old or new; and that's a lot more than you can do today. I wonder if any of those stores relocated, and if so, where?

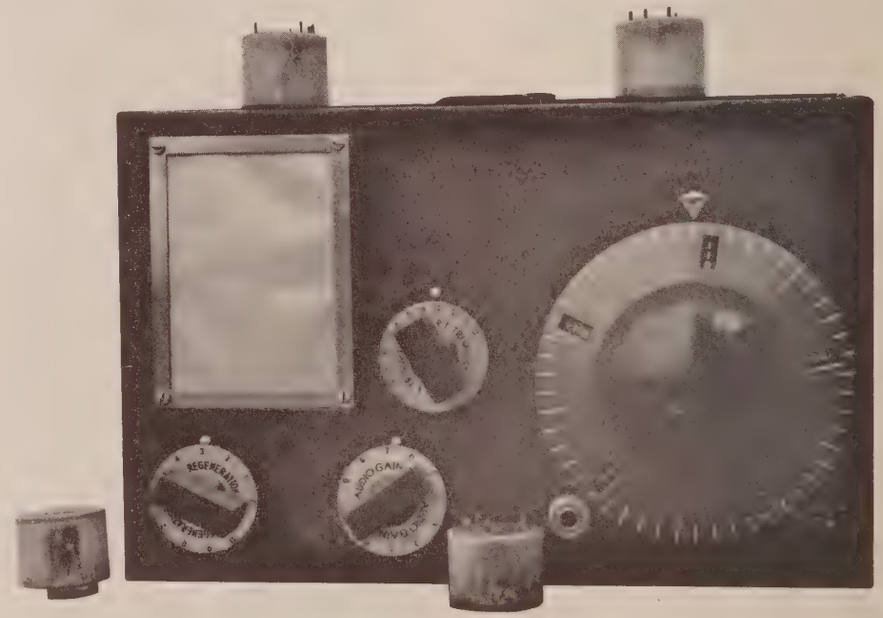
Some stores were at the tops of stairs one flight up. In many cases the light bulb at the head of the stairs was burned out, so the stairs were dark as well as creaking and rickety. I doubt that I could have gotten my mother inside some of those places, and I think if she had seen them, she might not have been so willing to let me visit them either.

In spite of the appearance of the stores, or whether they were one flight up or down, you could generally count on a friendly greeting once you got inside. The clerk, who was usually the owner, would say, "Look around, and if you don't see what you want, call me." And then he'd go about his business leaving you to browse. I had the contents of some of the smaller shops memorized and could almost always spot when he had sold something or, perish forbid, gotten in something new.

Theory and Practice

The technical articles of those times are absorbing, too. In late 1933 and early 1934, *R/9* ran a three-part series on single sideband transmission by Robert M. Moore. The series concludes with a schematic diagram of a rig that tunes 3900-4000 kHz. Moore's rig is almost identical in block diagram-form to that of A. H. Nichols in the January 1948 *QST* at the start of the current sideband activity. Moore uses translation frequencies of 10 kHz, 200 kHz, and 4150 kHz to reach 75 meters. Nichols used 9 kHz, 550 kHz, and 13.665 MHz to reach 20 meters. Both were filter-type rigs with the carrier filter in the high audio region. Moore used type 56 tubes with a 210 output stage; Nichols used mostly 6SN7s with an 807 output stage.

Looking back, I am sorry that ssb was not pushed harder at the time, but a start was made. James Lamb, then Technical



The National 1-10 was introduced in 1936 and was so named because it tuned from 1 to 10 meters (30 to 300 MHz) — this was quite a feat in those days. Note the short pins on the plug-in coils. K4KJ used this receiver in his War Emergency Radio Station (WERS) on the old 2½-meter amateur band during World War II, and reports he had "one of the hottest receivers on the net." This set had an rf amplifier stage followed by a superregenerative detector (both using acorn tubes), and two stages of audio; the set required an external power supply and speaker (*photo by K4KJ*).

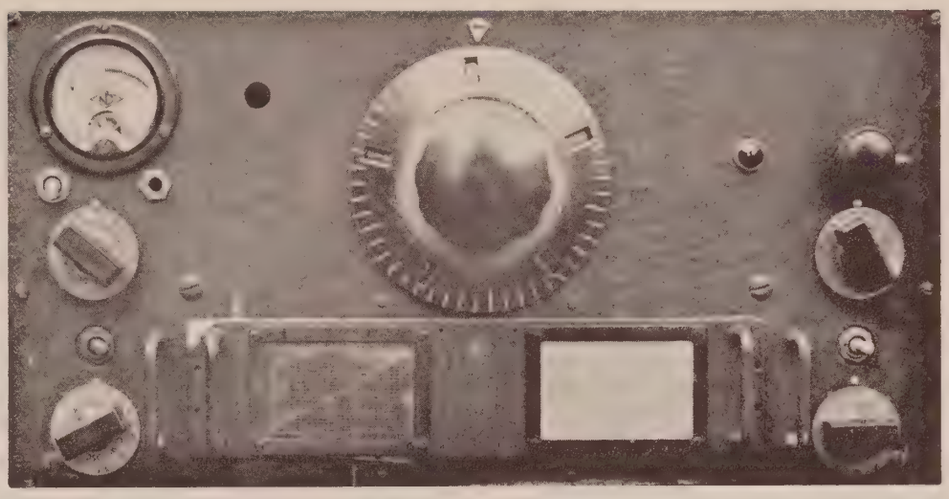
Editor of *QST*, started what was to have been a series of articles of SSB, but only the first saw the light of day. This article appeared in the October, 1935, issue of *QST*, but was not listed in the magazine index or in the annual index either, so you just have to know where to look (try page 33).

An editorial preface to Lamb's article says, in part, that in 1933 the ARRL Board of Directors instructed the technical staff to investigate the feasibility of single-sideband "carrierless" phone transmission on amateur frequencies. Accordingly, J. J. Lamb investigated both the theoretical and practical aspects and a report was rendered to the Board in 1934. Lamb's October, 1935, article and the articles that were expected to follow were taken from that report. Unfortunately, no articles followed. The October article is mostly an introductory type article. One of his concluding comments was especially interesting.

In explaining the difference between what is now known as ssb and dsb, he states that "With the carrier suppressed and both sidebands transmitted, it is practically impossible to supply a locally generated replacement carrier in the precise phase relationship needed for undistorted reception. For this reason (dsb) is hardly practicable." This information did not appear in *QST* nor the prestigious *Proceedings of the IRE* until the early 1950s, nearly 20 years later.

Lamb also designed an ssb transceiver using an improvement of his original crystal filter and incorporating a crystal oscillator-frequency multiplier chain which provided not only the transmitting carrier but also the receiver heterodyne frequencies from the same source. Remember, this was back in 1935, but it sounds like what is common practice today.

It's fascinating, too, to follow the development of the single-signal super-heterodyne receiver through James Lamb's articles in *QST*, including the development of the crystal filter and the noise limiter; in fact, several forms of the noise limiter are described. The Dichart, as well as Lamb's, circuits, seem to be still in use today.



An early National HRO receiver. A previous owner cut a hole in the front panel which considerably reduces its value to collectors of old radio sets (*photo by K4KJ*).

The electron-coupled oscillator (eco) and its offspring, the tri-tet oscillator, are both described in an article by Dow and several by Lamb. Both of these circuits were very popular up until the development of transistors.

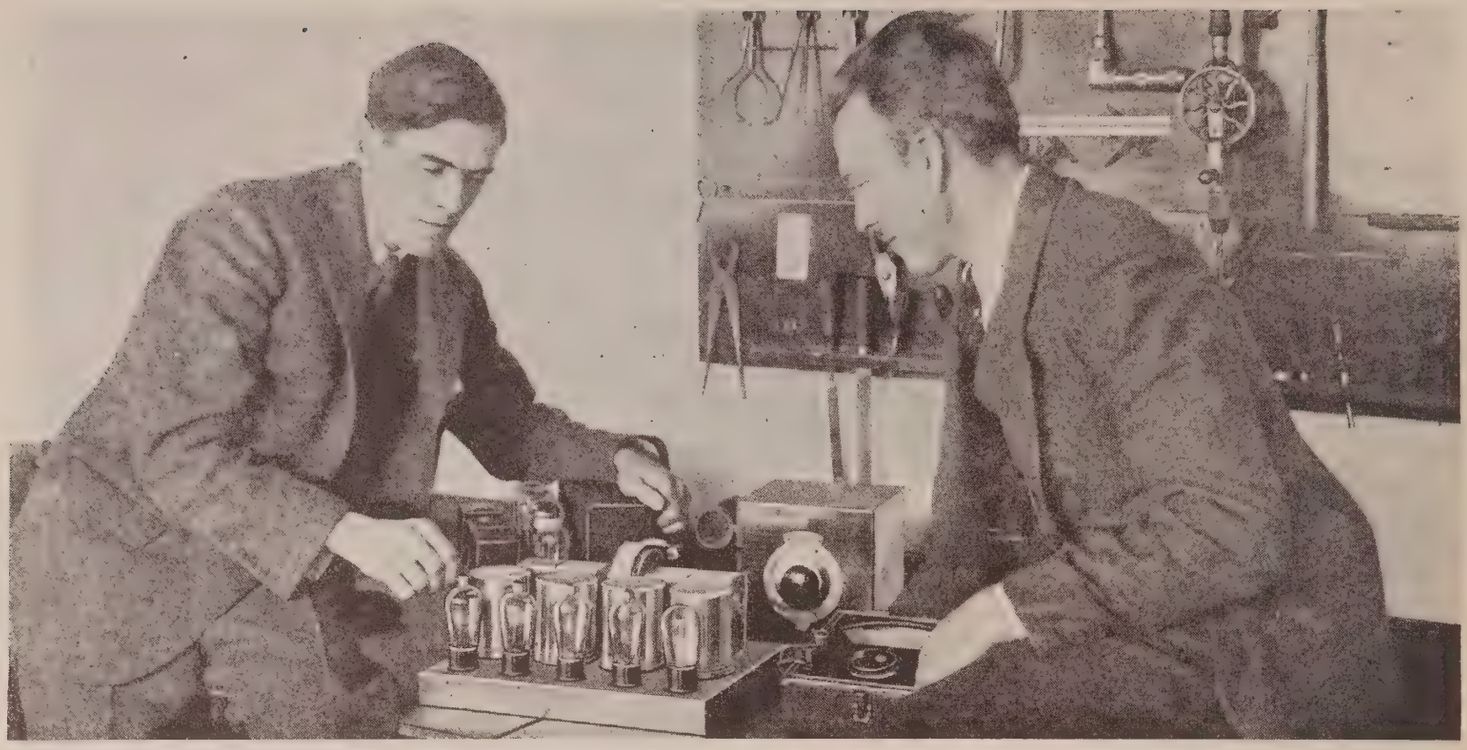
Speaking of transistors, I'll bet you thought they were a recent development. In the July, 1925, (that's right, 1925) *QST*, an "oscillating crystal" (galena type) is described. That was over 50 years ago. Today the oscillating crystal would be called a point-contact transistor.

Aside from historical interest, many of the early articles have a lot of good, useful technical information that has fallen down through the cracks. Windom's article in the September, 1929, *QST*, describing the single-wire feeder system that bears his name, explains how to adjust the antenna. This information has not appeared in any handbook or antenna manual since that time, to the best of my knowledge. The procedure is simple and straightforward and required only two rf ammeters. The charts and graphs that are in the books now are fine for a first approximation, but Windom's procedure must be used if a really *good* match is desired. A companion article in *The Proceedings of the IRE*, by Windom's associates, gives more detail on why the antenna works.

As another example, we think of the balun for coupling a balanced antenna to an unbalanced transmission line as a relatively new device. *Radio* for December, 1933, describes a "shielded transformer" to do the same thing. Furthermore, the 1933 article describes some of the problems that one runs into in using such a device; problems that have been generally ignored by all of the recent writers on the subject.

Engineering Practice

Beginning in *QST* for March, 1934, and continuing well into the 1960s, the National Company ran what was probably the most useful and successful series of advertisements in the history of radio publishing. These were one-page articles appearing as the first advertising page in *QST* and were usually written by James Millen (until he left National to form his own company). When I first began



James Millen (left) and Dr. Glenn Browning (right) look over the National Velvetone-29, a five-tube ac screen grid tuner with exceptional signal reception for its day. It was designed for operation with the Velvetone amplifier, the latest thing in high fidelity for 1929. Dr. Browning, who was co-inventor of the famous Browning-Drake circuit used in amateur receivers in the 1920s, went on to form his own company which still manufactures CB equipment. James Millen also formed his own company, and Millen capacitors, inductors, and precision mechanical parts are still used by amateurs who want the very best in their homebrew equipment (*photo courtesy National Radio*).

reading these ads as a boy, I was impressed by the good tips they gave on design problems of a modern receiver and on how to make things work better. As I reread them years later through the eyes of a professional engineer, I find they contain much more than hot tips: they also exemplify an engineering philosophy that is sorely lacking in many of the electronic products on today's market, for professional and consumers as well as amateurs, namely, attention to engineering detail throughout the product. How many times have you bought a product which has a good basic design, but was sloppily assembled? Or assembled using cheap and underrated components? Or how many times have you found a product that is well fabricated, but with sloppy design engineering?

I have long felt that one of the finest examples of attention to engineering detail was the HRO receiver, which appeared first in 1934 and stayed on the market with the same basic design well into the 1960s, almost 30 years. When it was taken off the market, it was not so much due to technical obsolescence, but to those damnable plug-in coils. Storing the coil set I *am* using isn't any problem because it goes in the receiver, but I have never yet found any good way to store the coil sets I am *not* using. In a field that changes as rapidly as electronics, a design that is accepted by the market place for almost 30 years is truly a good basic design. I have tried to use Millen's "attention to engineering detail" in my own designs, but will probably never be as successful as he was.

A pair of National receivers that were very popular in their day were the MB-29 and MB-30. The MB presumably stands for Millen/Browning. Glenn H. Browning later established Browning Laboratories and made amateur and commercial equipment until relatively recent times.

Early TV

Numerous articles on television appeared in early radio magazines. *Radio News*, in May, 1931, published a list of ten active TV stations along with the number of holes, revolutions of their disks, and their frequencies which were around the present 160 meter band. That's right: mechanical scanning. One of the stations ran 5 kW; a minor headline under the list was: "Television Programs Improving." That was 35 years ago, but you would never know it today!

All-electronic TV systems were also in evidence. One of *QST*'s most popular technical editors, Ross Hull, was accidentally electrocuted while experimenting with amateur TV in the middle 1930s. In 1940 *QST* published a three-article series describing a camera chain, TV transmitter and a receiver for the 2½-meter band. Amateur TV is just now catching on. Today we have slow-scan television in the hf ham bands. A fast-scan TV

repeater is operating in the Washington, D.C. area on the 450-MHz band.

People

It is interesting, too, to go back and read the early work of some of the people who have become common names in the ham magazines. One always associates longtime *QST* assistant technical editor, Byron Goodman, with ARRL. However, in the February, 1935, *Radio* he wrote the lead article on "The Noise-Free Autodyne." In *Radio*? How could you, Byron?

Another person usually thought of as an ARRL stalwart is the late Phil Gildersleeve, whose cartoons were enjoyed by the amateur community for so many years. "Gil's" cartoons are always associated with *QST*, but the December, 1934, *Radio* has three "Gil" cartoons. Gil had not yet fully developed the quiet, subtle humor that made his "Jeeves" monthly cartoons and his annual Podunk Hollow ARC Field Day *QST* covers such classics, but the lines and style are definitely "Gilean"; you wouldn't have any trouble recognizing them even if they hadn't been signed.

I also suspect that Gil was the originator of the Hashafisti Scratchi cartoon caricature that still appears on and off in *CQ* magazine. Most old-timers remember Scratchi as that mischievous ham from Osockme, Japan. In the 1934 *Radio*, the first drawing of Scratchi appears, which is the same as, but with much more detail than, the present *CQ* cut. (Or maybe *CQ*'s cut is worn out after all these years.) The early cut is signed with what appears to be Gil's "signature." The cut was obviously reduced from a much larger original, so I can't be sure and don't want to stick my neck out too far.

SCRATCHI
Osockme, Japan.
September 23, 1935.
Hon. Friend Editor of
RADIO, dear pal Ed.:—
Scratchi sit down for square meal at round table and make questions with self and answers for such that it seem appropop to open retale radio parts store here in Japan for purpose of making quick fortune from radio amateur trade.
All other radio dealer friends seem to ride in alleged automobiles, whereas Scratchi still find himself on foot travel basis. Prosperity are a state of the mind and into such I herewith make formal entry.

However, as I mentioned before, Gil did draw for *Radio* at about that time, and even under a magnifying glass the signature appears to have the same form as Gil's. I don't know when the cut was first used as my collection of *Radio* is not very complete prior to 1934 and I imagine the original drawing is long gone, too! It would be ironic if ARRL's most famous cartoonist originated the trademark for *CQ*'s longest running newsletter. If true, it is certainly a tribute to Gil's ability to have a symbol still in use after 40 years.

Speaking of Scratchi, do you realize how far back this magazine feature goes? Scratchi has been published on and off in *CQ* since its inception in 1945, and prior to that in *Radio*. Actually Scratchi goes back to at least April, 1922, when "Scratchi Starts Business Careering" by David P. Gibbons appeared in *Radio*. I don't know if even this was the first Scratchi or not, but it's the earliest of which I have a record.

The October, 1933, *Radio* has a letter from Osockme, Japan, after a 10-year absence, and promises a letter every month from then on, but gives no indication of the author. April, 1934, *Radio* has a photograph of a person identified as the originator of Scratchi, but gives no name. A box of "assorted Japanese wavelengths" is offered to anyone who can identify him; it says that he started in radio 20 years ago (20 years before 1934, that is).

At the 1975 ARRL Convention at Reston, Virginia, I asked *CQ*'s editor, "Who is writing Scratchi these days?" He changed the subject, and in a way I'm glad he did. It's much more fun to imagine that on the first of each month a special messenger from the Japanese Embassy appears at *CQ*'s editorial office with the latest missive which had just arrived in the diplomatic pouch from Osockme.

I would like to know about Scratchi's early heritage, though, say, prior to World War II. It would also be interesting to learn what happened to David Gibbons, who, I assume, created Scratchi, to the best of my knowledge, the oldest feature in any amateur magazine.

Receivers

The multitude and variety of equipment that was advertised in those old mags was equally

Rare Hallicrafters Skyrider Diversity receiver, which was marketed in the middle of the depression with a price tag of $425 — about six months pay for those who were employed. Only about a dozen of these sets were made. The receiver is about 3 feet (1 meter) long. In spite of its impressive size two additional chassis were used which were installed on either side of the receiver (*photo by K4KJ*).

absorbing — receivers, transmitters, antennas, accessories. At the top of the list were the dream receivers, the Hammarlund Super-Pro and the National HRO, probably the two most wanted receivers of the day. Incidentally, "HQ" stands for "Hi Q," an early trade name used by Hammarlund.

In the affordable price range, the receiver that caught my fancy was the RME 69 or 70. For some reason RME did not put labels on the knobs, so you just had to know what knob did what. As a young teenager, I was very impressed watching a skilled, experienced operator handle a 69 or 70. He would tune in a signal, then tweak a knob here and twiddle another there to make a cluttered signal R-9 just by knowing how, while I couldn't even turn on the ac power without assistance.

In addition to the 69/70, RME made a preselector, the DB-20, available as a separate item. They also made a combined preselector/receiver combination available as a single item. This model, I think, impressed me as a teenager the most. It had more dials and knobs than any other amateur model. I have had my eye open for one since boyhood, but have never seen one. I'm beginning to wonder if they existed only in the ads.

Of all the receivers, commercial or homemade, past, present, and probably future, the most impressive one of all must be the Hallicrafters Skyrider Diversity (Model DD-1). It looked like a real piece of equipment, for sheer size if nothing else. If you could tune in a signal with one, any layman could not help but be impressed by your skill as a radio operator.

I'll never forget when that receiver hit the street either. Hallicrafters took a two-page spread in *QST*; and it took two pages, too, in order to do justice to the thing. They sure don't build them like that any more, and it's probably just as well: the way they build houses today, the average ham wouldn't have room to keep one. On the other hand, an advantage of today's society is that there are usually one or two pick-up trucks in every neighborhood, so you wouldn't have too much trouble moving one — if you ever had to. This is another item I wonder if they really made, for I have never actually seen one, nor have I ever talked to anyone who has ever seen one.

By way of transmitters, National sold a rack and panel job; 600 watts, a-m or CW, in an open rack at that. There was no TVI to worry about. The model owned by a local amateur used Taylor TW-150's in the final. Remember those bottles? TW stood for "thin wall." Hallicrafters made the HT-4 for ham use. This equipment did yeoman duty in World War II as the BC-610. Either of those two transmitters was acceptable in my boyhood dreams: I wasn't prejudiced in my youth and would have been happy to have one of each!

For antennas you could have a Mims Signal Squirter on ten or twenty, or both, which was the first commercially available Yagi beam. It featured inductive coupling between feed line and antenna, for continuous rotation in either direction without slip rings, which you don't see any more. I believe the Mims name, trade mark and patents were bought out by Amphenol, but I have never seen them push the product. I don't know what happened, but they certainly had the jump on Telrex.

For the lower frequency bands, you could use EO-1 cable. This was a rubber-insulated 72-ohm impedance balanced line for direct

connection to the antenna. It worked fine in dry weather, but was a dead short after a rain storm. I still have a length of it around someplace for old times' sake. If you wanted all-weather operation, there were Johnson Q-bars to match a 72-ohm antenna to 600-ohm open wire line. Or, why bother to match anyway? Coaxial line was only used by the higher class stations on 5 or 2½ meters, and was always homemade. It was made from copper water pipe; plastic beads, made by Amphenol, separated the inner conductor from the pipe. Since the line was mostly air-insulated, the losses were lower than the commercial flexible cable available today.

October, 1939, *Radio* has an article by F. R. Gonsett entitled "Ten-Meter Auto-Radio Converter." Except for the tube type, this converter appears almost identical to the famous Gonsett Converters of the late 1940s that helped establish mobile operation as a viable means of hamming. An earlier article by Gonsett in October, 1938, *Radio* discusses mobile radio equipment in the 30-41 MHz band. These articles may have laid the ground work for the contribution Gonsett made to mobile communication following World War II.

For operating accessories, my dream station included an Edwin Guthman direct reading frequency meter, a Triplett model 1639 modulator monitor and a National 1- or 3-inch cathode-ray modulation monitor. After about 1932, you were expected to know what frequency you were on, and after about 1936, your modulation percentage, too.

Here's the answer to my final question: A heterodyne receiver has a separate local oscillator and mixer, as does a super heterodyne, but the output frequency of the mixer is in the audio range for the heterodyne receiver. In a super heterodyne receiver the output frequency of the mixer is at a *super*sonic frequency, usually called "the intermediate frequency."

An interesting series of three articles began in the January, 1935, *Radio* on "How Telegraphers are Made" by Ted McElroy, who at the time was the "world's fastest telegrapher." McElroy gives tips on sending and receiving and on how to run a code speed contest, well worth reading today. His comments on operating conditions at the time would be of interest to the history buffs and maybe to *Playboy* as well. The articles are very interestingly written, for his sense of humor is as good as his ear drums and fist.

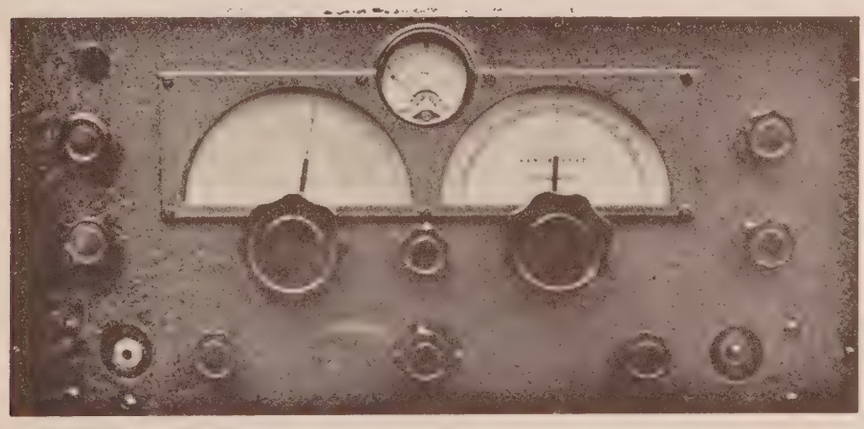
While on the subject of code, Walter H. Candler has an article on "Code Technique" in the March, 1934, *R/9* and another in September, 1934. As I recall, the Candler System was still advertising in *QST* up until recently, so he must have had some good advice. Good CW men (and women) seem to be becoming a thing of the past, so that I think his article would be useful reading today.

National 1-inch oscilloscope from the late 1930s. After about 1936 all amateurs were expected to know their modulation percentage. The National CRO used a 913 cathode-ray tube; a trapezoidal pattern was normally used because no linear sweep was provided (*photo by K4KJ*).

In the midst of my reverie, the XYL walked in and looked. She didn't say anything, she just looked. Sitting in the easy chair with magazines scattered all around me, while the paint brush had hardened and the paint can had been pushed back in the corner, I had been all too quiet.

From the dreams of my boyhood, a jolt to the realities of the present. Our youngest offspring is bringing her fiance home from college next weekend, so it's back to the woodwork.

The Lamb single-signal supers, the Jones 5-meter transmitters, the Nationals, the Hallicrafters and RMEs, all fade away into the background like DX stations on 20 meters. Never to be built, many of them, but never to be forgotten either. The schematics, the tube lineups, the panel layouts, even the parts lists are as indelibly impressed in my memory as they are on the pages of . . . those old radio mags . . . **HRH**



The Radio Manufacturing Engineers' RME-69 was a favorite with many amateurs in the late 1930s. Notice that there are no labels on any of the controls — the operator just had to know which ones were which. Accessories which were available for the RME-69 included a high-frequency preselector and a tunable vhf converter. Amateurs with that lineup on their table had a very impressive looking station (*photo by K4KJ*).

Early Wireless Stations

BY ED MARRINER, W6BLZ

The old time wireless stations, like the operators who manned them, are gone. The golden age of the sea-going wireless operators who operated the rough notes of spark transmitters or nostalgic musical notes of the arc, made the blood flow in any young man with a wanderlust. The old quenched spark gap with the pickle-jar muffler had a far away sound and lured many an operator off to sea.

In the very beginning I can imagine the young operator, his first time on board ship, with a new transmitter resting in front of him, getting the fragrant smell of lacquers and phenolic compounds enclosed in the tight, stuffy wireless shack. Outside, the smoke, stack gas and carbon grime covered the bulkhead. The canvas lifeboat cover outside the porthole was encrusted with a combination of salt spray and soot.

Perhaps the new operator would familiarize himself with his new treasure before the ship got underway. He might turn on the switch and press the key as they taught him in the Marconi School in San Francisco. Maybe he would take a pencil and draw an arc from the antenna leadin, or watch the meters flick a few times to instill confidence in himself (this was before the time of radio inspectors).

Once back from a long voyage, Sparks would come into port looking for a new berth, spend his money and be out of work. What would he do? Casserly's Bar on Market Street was the most likely place where he could get a free

Cliff Watson, K6WC, pounding the key at the Dewey Mine Station near Grangerville, Idaho in 1906.

hardboiled egg and a ham sandwich for the price of a five-cent beer.

Next in the order of things, the wireless operator had to check in with Malarin, the hiring agent. Malarin would generally tell young Sparks to wait in the static room. Hours would go by. Finally, the young man would stick his head out the door to find Malarin had forgotten him and gone off to the ball game.

Eventually he would be on board another ship with a little more experience. He might have picked up a bag of silica so he could pick out some good hot crystals for the detector in the ship's receiver. Some of the time might be spent building a receiver from army surplus audio tubes or fixing the spark gap by putting a 30-30 shell case over the gap for a better sounding note. There was also that little trick of dropping the helix to broaden out the signal. Once out of port, he could contact a navy station on 2300 meters using this modification.

On the return trip, young Sparks might have gathered a few bottles of "Old Crow," because prohibition was in effect, and hide them away for his friends. The stowage problem was always solved by putting a few bottles from Canada in the transformer oil or behind a high-voltage fuse panel.

George S. Hubbard, the wireless operator who flashed the first SOS from the Pacific Mail Liner Asia when she ran aground on Finger Rock on the China coast.

Portland, Oregon's own retired radio inspector, Joe Hallock, W7YA, on board the SS Alaska in 1917.

How did wireless start and lead up to glamorous sea-going jobs? There were many tinkerers and experts like Loomis, Tesla, Preece and others fussing with wireless before Marconi, Professor Amos A. Dolbears, of Tufts College, attested to the successful experiments of shipboard wireless by Lt. Bradley A. Fisk prior to August, 1888. Lt. Fisk wound a number of turns of insulated cable around the USS Newark lying at the New York Navy Yard and likewise around a yard tug. He could receive signals a short distance away with a telephone receiver. The system, however, was called induction wireless, and he couldn't claim the invention of wireless.

Nothing really happened in the way of commercial communication until Marconi connected an antenna to his transmitter in 1895. The libraries are full of books about Marconi and his early experiments. It is noteworthy to say in passing that while others dabbled, Marconi had vision and did something about it! On June 2, 1896, he obtained a patent and took his apparatus to England to obtain commercial backing.

Things began to happen fast, and in just a few years, wireless communications were a reality. In 1897, Marconi was operating his own company and was transmitting signals 12 miles away. He reported that Kingstown Yacht Regatta for the British newspapers ashore as a publicity stunt in 1898. The next year, he was able to increase his transmitting distance to 66 miles. The same year he founded the American Marconi Company in Wellfleet, Massachusetts.

The U.S. Navy first tried wireless when Marconi

Syd Fass, W6NZ, on the left, and W7QY, with an unknown operator on board the SS General Lee near KPH about 1912.

installed sets on three naval vessels. The first official naval message actually took place on September 30, 1899, when Marconi sent the following message:

Via Wireless Telegraph:
To: Bureau of Equipment,
Washington, D.C.
From: USS Connecticut
Under way in Naval parade via NAVESINK station. Mr. Marconi succeeded in opening wireless telegraphic communication with shore at 1234 PM. The experiments were a complete success.

Signed Blish, Lt. USN

This message was received at the Highland Station on the New Jersey coast. By 1901, all major ships in the U.S. Fleet had been equipped with German-made wireless equipment after three U.S. Naval officers had been sent to Europe the year before to examine various equipment.

On December 12, 1901, Marconi sent a signal across the Atlantic Ocean. His signals were also reaching the Hawaiian Islands, and the army became interested. During 1902, the navy was installing Slaby Arco, Brau-Siemens-Halske equipment designed by Rochefot and Ducretet of France and equipment made by Lodge Muirhead of England. They also purchased DeForest equipment and quenched gaps of American design, including the Lowenstein gap, Simon and others, but it was not until 1909 that the USS Connecticut and USS Virginia had wireless telephone.

Military communications really started in 1903 when the first real message was sent across the Atlantic Ocean and the U.S. Army established communications in Alaska. The first message in Alaska was transmitted on August 7, 1903. At this time the navy had only six wireless stations. Because of foreign control of Marconi equipment, a complete change was made to the Slaby-Arco equipment.

The first International Wireless Conference was held in 1903. At this conference, CQD was added to the operator's signals for distress; however, the Germans continued to use SOE. The New York Navy Yard had a wireless school established with 13 students. DeForest went to England to demonstrate high speed Morse sending. Pop Athern and Harry Brown, two DeForest men, set up a station in Shantung, China. Romance had begun! A wireless net from Lake Erie to Buffalo, New York was set in operation — a full 180 miles. The operators were known for their Lake-Erie swing, a term which has been handed down and puzzled many over the years.

By 1904, the navy had eighteen shore stations and thirty-three ships equipped with wireless. Nine ships of the Asiatic Squadron also had wireless. The Saint Louis Fair exhibited a 20-kW transmitter in contact with Chicago, 300 miles away!

The navy completed the West Coast wireless chain of stations in 1905. The same year SOS became the international distress signal. Lee DeForest sent the Institute of Electrical Engineers his first paper on the audion tube, and the first voice transmission by wireless was made.

In 1906, the United Wireless Company started spreading out over the U.S.A. Teddy Roosevelt's Great White Fleet was outfitted in 1907 and started on its way around the world. Twenty ships had DeForest equipment on board which was used to contact naval stations up and down the West Coast. The next year, the USS Connecticut, en route to Hawaii and New Zealand, contacted the naval wireless station high atop Point Loma, California, expanding the communications distance to 2900 miles.

In 1910, the Ship Act required all ships carrying 50 souls, including the crew, to have wireless, although no

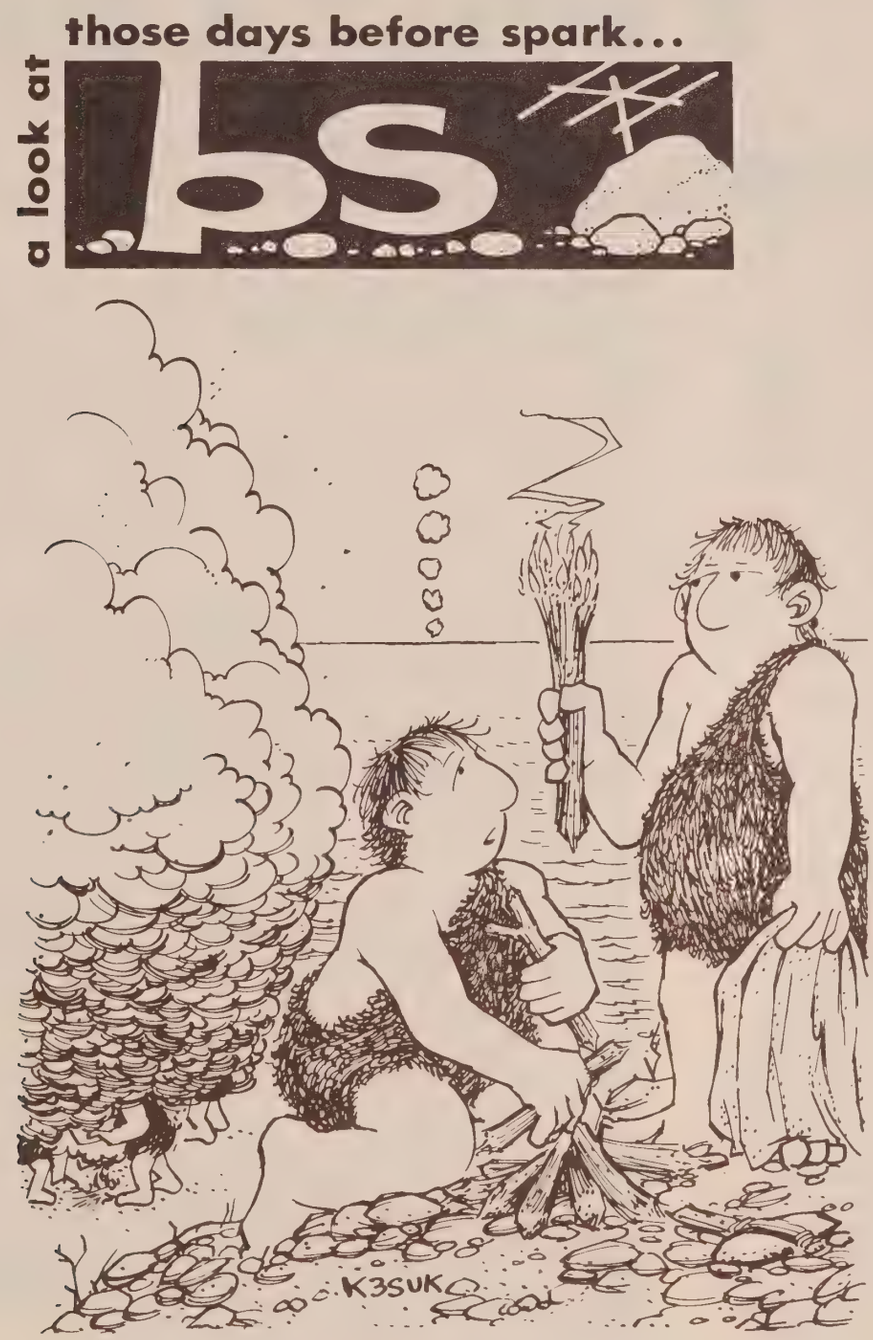
Imprisoned SS Asia on the jagged rocks, surrounded by a mob of maddened and blood-thirsty Chinese pirates.

license was required. On June 30, 1911, the young United Wireless Telegraph Company hung out the "Out of Business" sign. The officers of the company pleaded guilty to Marconi infringements and were convicted of selling stock under false pretenses. The company was purchased by the Marconi Company on June 29, 1912, the same year the Radio Act required operator and station licenses.

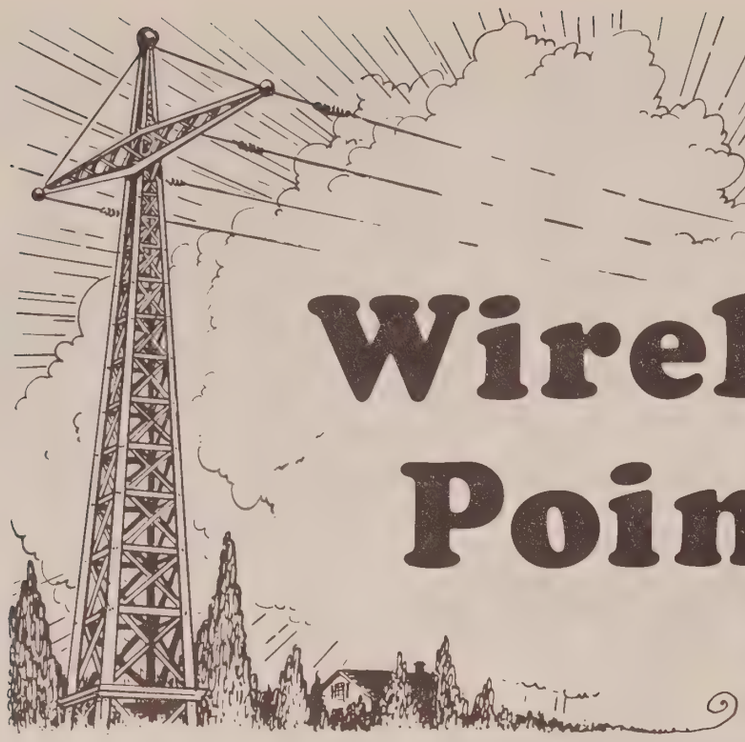
In 1914, V. G. Ford Greaves compiled a chart showing that the average age of the sea-going wireless operator was 19. Several operators were listed who were only 15. They could be found in the shacks of the SS Asuncion, SS Yale and SS Harvard, cruising up and down the West Coast for United Wireless Telegraph Company.

In the Northwest, a lad could always find a berth on the Rose City H2 or stay ashore at O-2 in Portland, S-2 in Seattle, or take a spin at some of the fish cannery stations in Alaska. It was a great life and a thrill to listen to the rotary spark gap and fog horns when coming up the Northwest Coast. Alas, those days are gone forever — just a dim memory for a few of the old timers who are left.

ham radio



"Yuh can't get thru a pileup like that . . .
yuh gotta better chance out here on the edge."



Wireless Point Loma

BY ED MARRINER, W6BLZ

The fog lifted early that morning of 12 May 1906. A young Navy Chief Radioman, R. B. Stuart, unfurled a bright new flag and ran it up the mast of a new wireless station atop Point Loma, California. Then he went inside the yellow cottage and pressed a telegraph key. With an ear-splitting, 500-Hz crash (500 **cycles** in those days,) a whitish-blue spark jumped across the ten-inch gap, and the U.S. Navy wireless was officially on the air.

This station was one of the many established on the West Coast for the Navy during 1902-1903. The call sign, TL (later to be changed to NPL), was familiar to radio officers on ships hundreds of miles at sea as they steamed up the Mexican Coast from Cape Horn. (The Panama Canal was still a dream then — the first ship went through in August, 1914.)

The romance of those early days of maritime wireless was recalled for local San Diego amateurs as Chief Stuart, an engineer with the Eleventh Naval District for many years, told his story when the U.S. Navy Electronics Laboratory ground-breaking ceremony occurred at the old Point Loma wireless-station site on 24 June 1949.

The old radio shack where Chief Stuart first put TL on the air was now a transportation office. The old Massie spark transmitter was gone, as were some of the more advanced transmitters that superseded it in later years. In the weeds around the old site you could still see remains of angle-iron anchors where the old towers once stood.

All was now gone except for the memories of the whining notes of rotary-gap transmitters, not-so-whining

Point Loma station about 1905 with a coherer on the left. There's a hot-wire ammeter on the wall in back of the oscillation transformer; the glass-insulated transmitting capacitor is below.

notes of nonsynchronous straight gaps, and the sweet, dc whistle of the old Poulsen arcs. Sound maudlin and corny? Perhaps. But let me tell some of you youngsters with your solid-state receivers and strip-line devices about these radio operators in the early days of wireless.

The pioneers

A commercial radio operator working in the maritime service, from the turn of the century to World War II, was a fellow with a unique talent.

He could sit in a stuffy, five-by-nine-foot shack on an old rusty coal-burning tub and copy press at thirty words per minute on a beat-up Remington (provided by the owners if they felt like it; else he used his own). At the same time, he could carry on a conversation with the mate about their plans when the ship anchored in Manzanillo, while listening with one ear for his call sign on the 500-kHz guard band. (Split phones, you know.)

If they were in a heavy seaway, the old kettle would list fifteen degrees, and his bug would hang up on the dots, but Chief Stuart, at TL, couldn't tell the difference because the shipboard transmitter was being worked by a **radio operator**. It would have been great to use a mike and talk his message. Then he could have used that bug hand to pour his coffee and light his cigarette with the other. Yes, those fellows were somewhat handicapped in those days. But they were radio operators . . .

As I said, all was gone when Chief Stuart told his story, as were most of the operators. Si Slocum, W6JH, passed away a few years ago, as did Chief Stuart. A few of the early operators are still around, though. One is Fred Nickel, W6CKZ, and Admiral Ellery W. Stone, USNR (Ret.) who, as a young Lieutenant in the USNR, wrote "Elements of Radio Telegraphy."

Historical Collection, Union Title Insurance Company, San Diego, California.

Early Naval stations on the West Coast

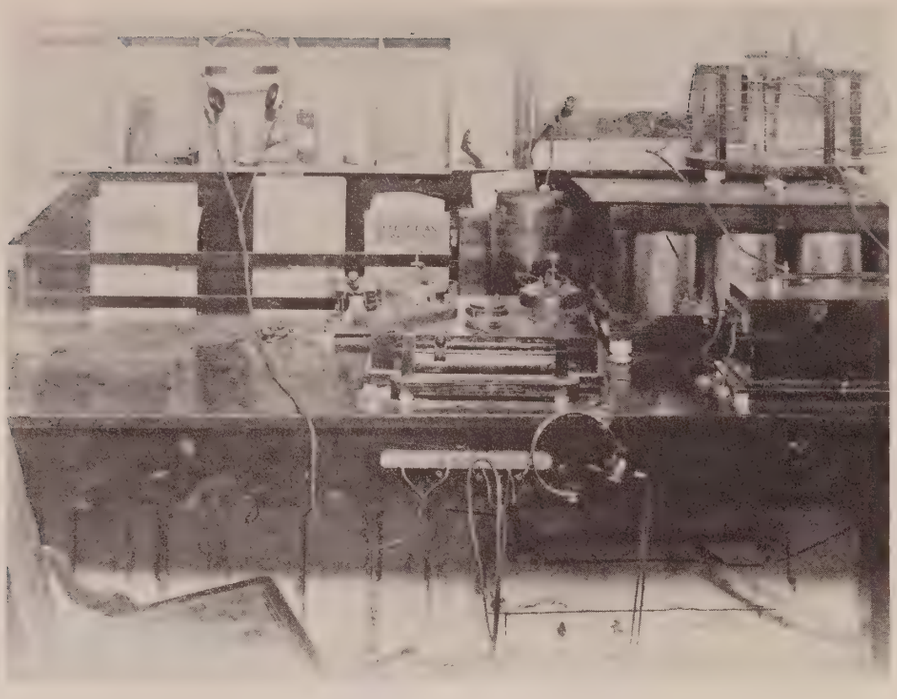
NPA	Cordova, Alaska
NPB	Sitka, Alaska
NPC	Bremerton, Washington
NPD	Tatoosh Island, Washington
NPE	North Head, Washington
NPF	Cape Blanco, Oregon
NPG	Mare Island, California
NPH	Vladivostok, Siberia (temporary)
NPI	Farallon Islands, California
NPJ	Balboa, Canal Zone
NPK	Pt. Arguello, California
NPL	Pt. Loma, California
NPM	Pearl Harbor, Hawaii
NPN	Guam
NPO	Cavite, Philippines
NPP	Peking, China
NPQ	St. Paul, Alaska
NPR	Dutch Harbor, Alaska
NPS	Kodiak Island, Alaska
NPT	Olongapo, Philippines
NPU	Tutuila, Samoa
NPV	Seward, Alaska
NPW	Eureka, California
NPX	San Pedro, California
NPY	St. George, Alaska
NPZ	Puget Sound, Washington

The call letters of Naval stations at yet an earlier period were:

TA	Cape Blanco, Oregon
TD	Tatoosh Island, Washington
TE	North Head, Oregon
TG	Mare Island, California
TH	Farallon Islands, California
TI	Goat Island, California
TJ	Pt. Arguello, California
TL	Pt. Loma, California
TM	Pt. Loma, California

Early detectors

Across the room from Ellery, as he wrote the book, were the old copper helix and the marble



In the early days, amateurs often worked Naval and commercial stations. Gene Skinner used this station in San Diego in 1909 under the call "ES" to contact Navy ships in Magdalena Bay 500 miles away.

insulated switch panels. His desk was probably not much different from the earlier ones, which held the coherer detector, operated by tapping its glass tube with a doorbell clapper. This marvelous device would then uncohere the silver filings so the detector would receive again. It was a pretty slow business.

Other detectors were the magnetic detector, (which had to be rewound ever so often), the galena, silicon, or carborundum. After every message the galena would become desensitized because of the local large currents produced by the transmitter. The operator would then have to feel around on the surface of the crystal with the cat-whisker for another sensitive spot. You can well imagine the experience of the midwatch operator, who had just arrived at the station, after winding his way up the muddy canyon road in the horse and buggy. He'd probably been on liberty down in the small community of Roseville where he'd had a few beers. He was shaking so badly from the effects of the beer and cold that he wasn't in any condition to fuss around with any cat-whisker.

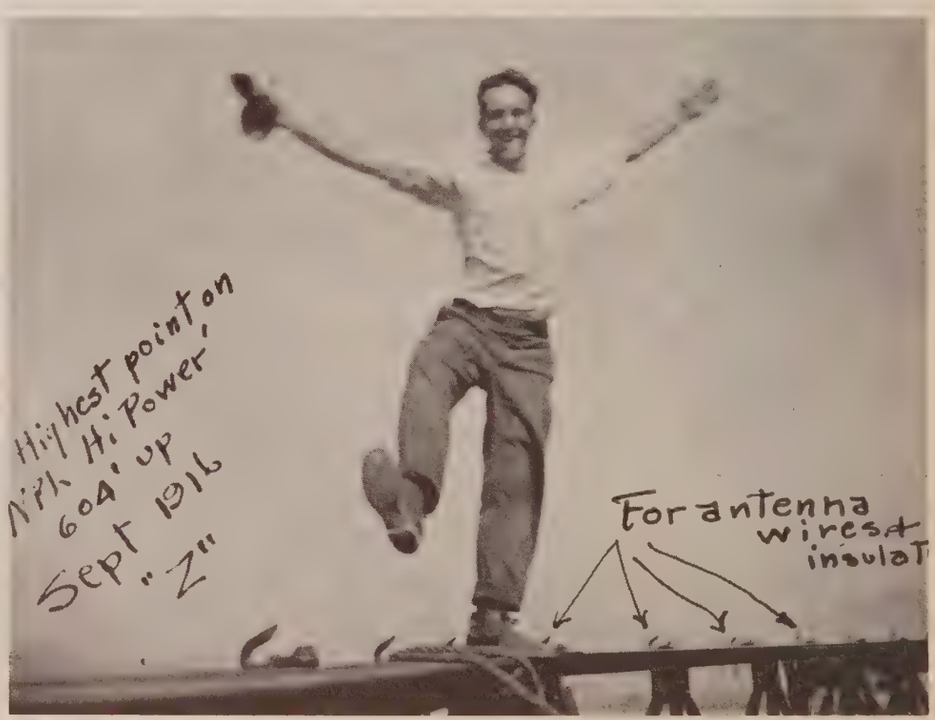
In those days the operators at TL did their own cooking, and many local residents lost chickens to night foraging parties from the station. In the daytime, the rabbit population of the Point would bounce out of sight as the operators with their shotguns approached, almost in the exact spot where Richard Henry Dana and a companion had hiked up over the point eighty years before.

The great white fleet

In 1908, NPL took part in wireless experiments with the Great White Fleet, which was sent around the world by Teddy Roosevelt. The Fleet had been working its way up the coast of Mexico to the coaling station at Magdalena Bay in lower California, and local amateurs competed with TL in contacting the ships. Dr. Lee DeForest was on board one of the ships, the USS Connecticut, the flagship. He had his audion-tube receiver aboard.

These early experiments with the USS Connecticut were soon forgotten as the station later was busy with its growing traffic, or was sending news from the San Diego paper to the ships at sea, with "CQ de NPL-Press." Wireless operators on oil tankers, passenger ships

Joe Hallock, W7YA, Portland's now-retired FCC inspector standing on top of the 604-foot NPL tower in 1916.



and cruisers adjusted their cat-whiskers and began to copy the messages to put them in touch with the world. Point Loma's voice was available for both civilian and Navy traffic until 1915, when a German Telefunken transmitter was installed, and the old spark gap was silenced for all time, only to linger in the memories of many old-time wireless hams around San Diego who had hiked out to the station to watch.

Mr. Eugene Skinner remembers riding out to the station in 1909 on his motorbike after working TL on his spark rig. A couple of other early amateurs who used to contact TL were Harry Gough, K6AJ, and the late Carl Rogatsky, W6PG. These memories will probably bring letters from many of the old ops who listened to the sweet, 500-cycle note blasted through the air from the old Telefunken transmitter, which was installed in 1915 in Chollas Heights, east of San Diego.

ham radio

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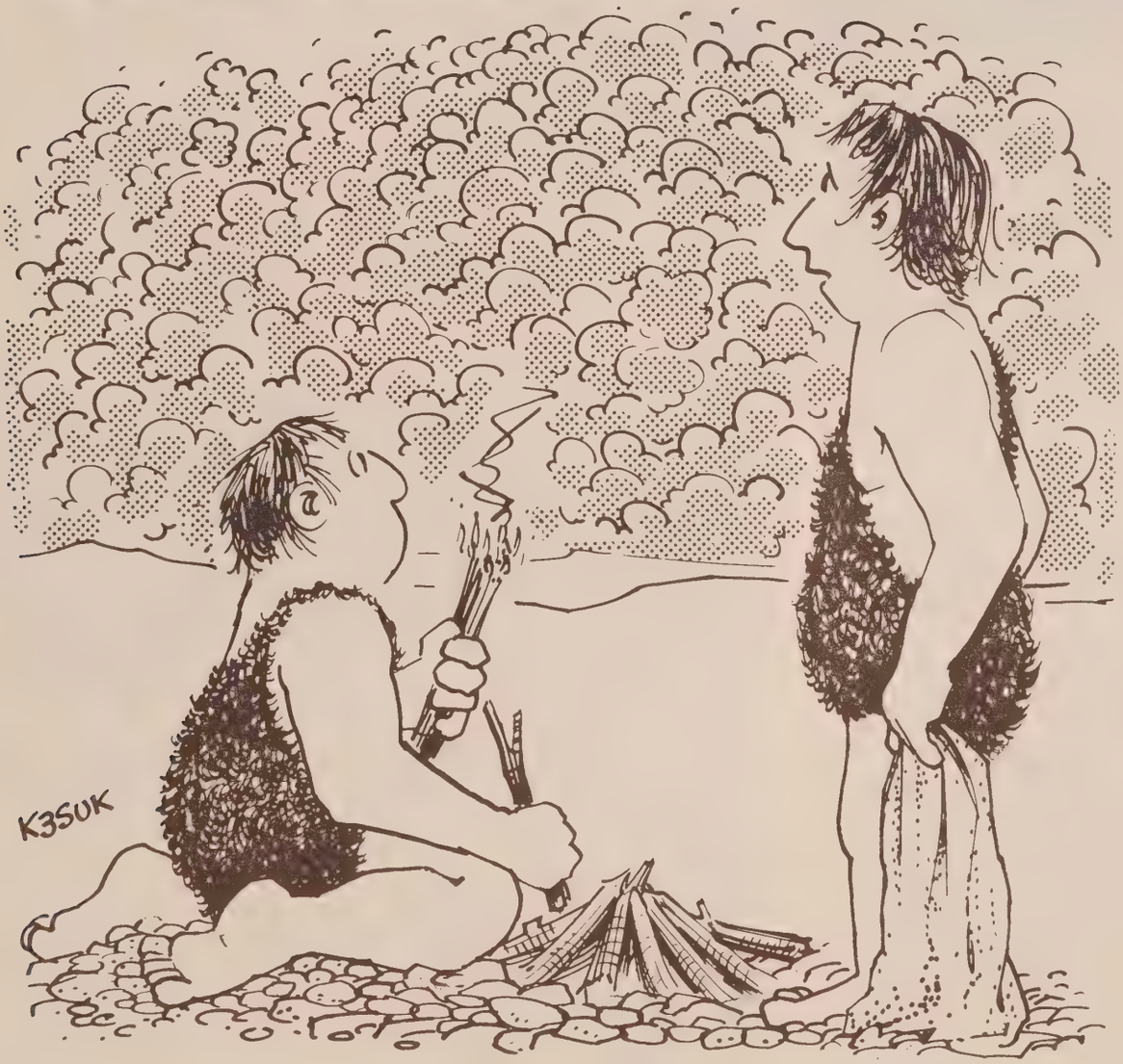
a look at **those days before spark...**

bs



"Either the skip is open to California or the whole damn country's on fire!"

1902 Catalina Wireless

BY ED MARRINER, W6BLZ

Researching early wireless history is a part of ham radio I enjoy very much. It's a real challenge, because many events pertaining to new installations were not recorded in print. Newspapers didn't give much coverage to new wireless plants, probably because they were considered just another business venture without much news value.

Tracing the history of wireless communication calls for detective skills and infinite patience. To find really early information, one must talk to the oldest operator one can find, who might have talked to the oldest operator in his time. This takes a lot of digging and leg work, but results are rewarding if one has a soft spot in his heart for the early wireless pioneers.

Anyone who operated one of the very early stations is now nearing the century mark. He would be called an OOOT, or Olde, olde, old timer. In descending order of venerability, early operators might be classified thus:

OOOT	1900 - 1910
OOT	1910 - 1920
OT	1920 - 1940*

*The nonlinearity of the time scale after 1920 reflects the growth of the state of the art. **Editor.**

Detective work

One of the earliest wireless circuits I'd heard about was established by the Pacific Wireless Telegraph Company around the turn of the century. It was between Los Angeles and the city of Avalon on Catalina Island, which is about 30 miles off the California coast.

My quest for historical data on this installation took me through the Los Angeles Times' morgue, the public library, and the Avalon Chamber of Commerce. As I said, nothing of significance was in print so I kept looking.

The trail finally led to Howard Seefred, 6EA. Historians will recall 6EA's contributions to the early ARRL relay work in cross-country communications on the "short" waves. Howard has since passed away, but he provided me with some good clues about the old PW station and some of the operators. As a boy, Howard used to hang around the PW station at 7th and Alemeda in Los Angeles. He recalled a PW operator by the name of A. F. Krenke, who gave generously of his time and knowledge to help 6EA get started in wireless.

Howard also remembered that Mr. Krenke had moved to San Diego, where he operated a station for PW until about 1916. With this information, I contacted old-time Navy operators and early hams in the area in an attempt to find Mr. Krenke. As if by a miracle he was located, and with a steady hand he described his part in the drama of early wireless in Southern California. This is his story.

Early circuits

The Marconi circuit between Catalina Island and Los Angeles was installed in 1902. The power of the press was augmented by that of the 5-kW straight gaps of the PW

stations. News items transmitted over this circuit were published in the Avalon paper. The Jefferies-Fitzsimmons fight results, for example, appeared in print hours before the news arrived by steamer from the mainland.

During the first few years of operation, the mainland PW station was located at San Pedro (15 miles or 15 minutes via the freeway today from downtown Los Angeles). In February 1905, the San Pedro plant was moved to 7th and Alameda after it was determined that messages could be sent the extra distance.

PW technicians winding a helix coil for the Mt. Tamalpais station; Mr. Krenke at far left. Cloth stacked in corner was applied over each layer of wire and coated with shellac. Process was not unlike that used for making today's surfboards with fiberglass.

More detective work

The first criminal case to be solved with the aid of wireless was recorded during the first year of operation of the PW circuit. Seems that two fellows left Avalon on the steamer with the cash and some liquid goods from the Hotel Metropole bar. The hotel manager, anxious to try the new wireless (and retrieve the loot), sent a message to the San Pedro police department.

The San Pedro police were waiting at the dock when the steamer arrived from Avalon. The culprits were apprehended, much to their amazement and chagrin. The cash was returned to the hotel manager, but the bottled goods somehow disappeared en route. In any event, this seems to be the first recorded evidence of public service by wireless telegraphy.

Inside the PW station in Los Angeles, August 1903; Mr. Krenke on watch. The knife switches and "bug eye" meter were typical of a powerful wireless plant.

Help wanted

During this period, Mr. Krenke was a telegraph operator for the Southern Pacific Railroad at the Lone Palm Tree Watering Station (now known as Palm Springs).

Mr. Krenke went to Los Angeles shortly after the robbery and was fascinated by the excitement of wireless' contribution to law enforcement. Such events helped to increase business for PW, and they were looking for another operator. Mr. Krenke applied for the job and was assigned to the Avalon station, where he worked for about two years.

Catalina wireless

The Avalon station was on a hill above the dance casino (now the St. Catharine Hotel). Operating technique wasn't as polished as it is today. At the end of a transmission, for example, the operator had to shut down the motor generator so he could copy the message from Los Angeles. If he missed a word or two (which was not uncommon), he had to start up

Catalina Wireless, 1903. It's still a DXer's dream location. Mast was 70 feet high and supported a Marconi antenna.

the gasoline engine that ran the generator so he could ask the Los Angeles station for "fills", as they were called. Such was break-in operation in those days. It was slow — but who hurried in 1903?

The wireless news

A synopsis of the Los Angeles Times was transmitted to Avalon each day, amounting to about 600 words of press. The news, hot off the crudest of receivers, was typeset and printed in Avalon. The paper was called the "Wireless News" and sold for ten cents. A mint copy of this publication would be worth a great deal today.

Business expansion

The Pacific Wireless Telegraph Company had big plans. Management made the decision to install a powerful station on Mt. Tamalpais, near San Francisco. The idea was to send messages all the way to Honolulu, an ambitious dream in 1906.

A construction crew from PW first installed a station in the Merchant's Exchange building, with offices on the 14th floor, in downtown San Francisco. Then a station and antenna tower were installed on Mt. Tamalpais.

On April 18th, 1906, an earthquake rocked San Francisco. The tower on Mt. Tamalpais came down, and the station was completely wrecked. This dashed the hopes of the company that tried so hard — and the date of wireless communication between California and Hawaii was set back many years.

Wireless San Diego

Out of the San Francisco wreckage of 1906 emerged a new wireless company. It was called United Wireless and Telegraph, and was founded in 1908. Mr. Krenke worked for UW at their station in San Diego. The UW plant was installed on the Granger Building at 5th and Broadway, San Diego. This venture didn't last long, and Mr. Krenke again found himself out of a job. He delivered groceries for a while to make ends meet, then he heard rumors of a new wireless station to be installed in San Diego. But I'll let Mr. Krenke finish the story.:

"I'd heard that the Federal Wireless and Telegraph Company was interested in establishing a station in downtown San Diego. I considered the possibility of the U.S. Grant Hotel as a site. The hotel manager, a Mr. Holmes, was sympathetic to the idea, and we wrote to the Federal Wireless Company in San Francisco.

*This was supposedly the result of work by one Charles Hatfield, an itinerant rainmaker, who was hired by the San Diego City Council to end a long drought. Hatfield never collected his $10,000 fee, because the flood was considered an "act of God." Litigation by Hatfield's descendants is still pending in San Diego courts.

Mr. Krenke, chief operator, Catalina Wireless, 1903. Blackboard at left announced incoming messages for the locals.

"To make a long story short, I was hired by FWT's chief engineer and was put in charge of the station. I installed the antenna system. The transmitter was a Poulsen arc, which was powered by a 500-watt dc generator. I hired a messenger boy and was in business.

"After about five years (I'm not sure of the date, but I think it was 1915) a terrific storm hit San Diego. Heavy rain caused a dam to break, which created a flood that destroyed thousands of dollars worth of property.* San Diego was isolated except for the wireless station. During this terrible storm, my station handled Western Union and Postal Telegraph traffic in addition to our regular work. I stayed at the key for three days.

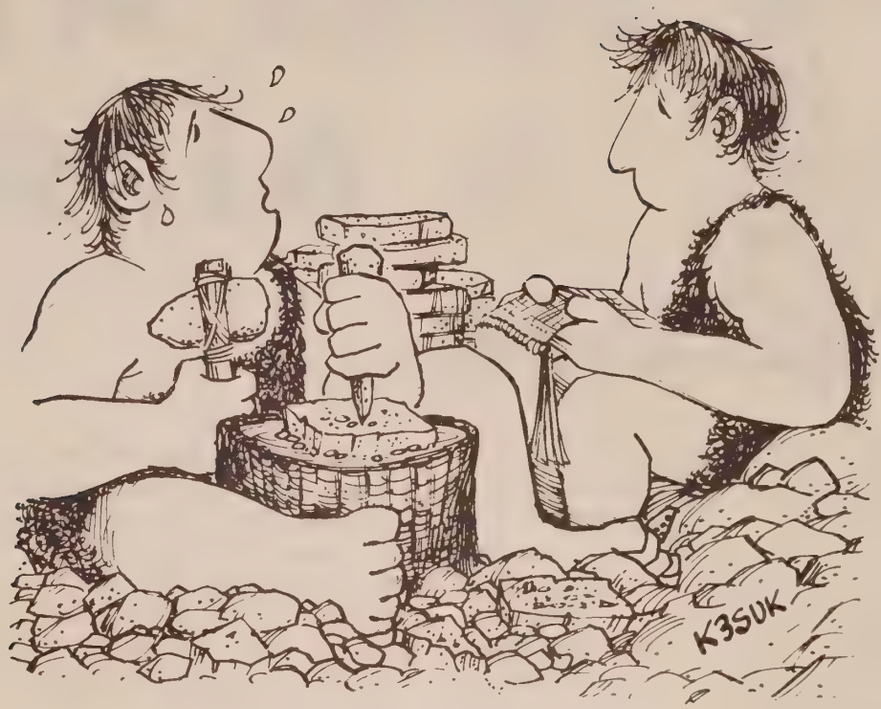
"There's little left to tell. I was sworn into the U.S. Navy in 1917 and operated radio NPL on Point Loma. After World War I, I worked as a civilian operator in San Francisco, ending a half century as a wireless operator."

ham radio

a look at

those days before spark...

bs



"I love to operate . . .
but these QSL's are pure drudgery."

"I tried mobile once . . .
yuh run into a lotta problems."

the First Wireless in Alaska

BY ED MARRINER, W6BLZ

At the turn of the century the Alaskan gold rush was in full swing. Army forts had been established to look after the gold seekers, and a reliable communications system was needed. A wireless communications system was established, later to be called the Western Alaska Military Communication and Telegraph System, which eventually employed many radio amateurs who as civilians became speed operators on one of the country's fastest CW nets. They were called WAMCATS.

How did it all start? Historically, it was the first communications system on all of the West Coast of America. During the various Alaskan gold rushes, starting in 1898, towns and camps mushroomed overnight, with plenty of tin horn gamblers and other characters (as described in the poems of Robert W. Service) wandering from place to place. By 1900, better communications than messages by boat or dog teams became a necessity.

In 1900 Congress gave the U.S. Army Signal Corps money to improve wireless communication and charged them with the responsibility for a cable line to Alaska and the interior. This cable line was constructed under great difficulty for the poles had to be set into permanently frozen ground. This was the first of many factors which launched the Army into wireless communications.

In 1903 the U.S. Army had strung wires to St. Michaels, Alaska, and was faced with the problem of making it to Nome. This meant the choice of going around Norton Sound with a pole line under the worst of primitive conditions or laying a cable which would be carried away by ice each year.

The Signal Corps, by now, had used wireless telegraphy and decided that the last link between the stations at Nome and St. Michaels was to be a wireless one. The entire system consisted of 107 miles via wireless, followed up by 3883 miles of cable to Seattle. This same year, 1903, Dr. Lee DeForest experimented and exchanged satisfactory communication between Fort Safety, Alaska, and these stations which was the final report of the project which started back in 1899.

Leading up to the Alaskan Wireless Network was a report by the Chief Signal Officer who, in 1899, announced that the Signal Corps had devised a system of wireless telegraphy. This was the first publicly operated network in America. Improved in detail, it worked successfully over limited ranges between the harbor fortifications for which it was planned. Recognizing, however, that rapid advances were sure to be made by civilian experts, the Chief Signal Officer decided to adhere in this matter to his general policy. This meant that experimental work would be carried out by the Signal Corps only under those conditions where there wasn't any easy recourse to the commercial and industrial establishments of the United States.

Owing to repeated failure of several wireless telegraph companies to furnish a reliable and satisfactory system of wireless telegraphy in Alaska over a distance of 100 miles, the Chief Signal Officer decided in 1903 to have all existing systems examined

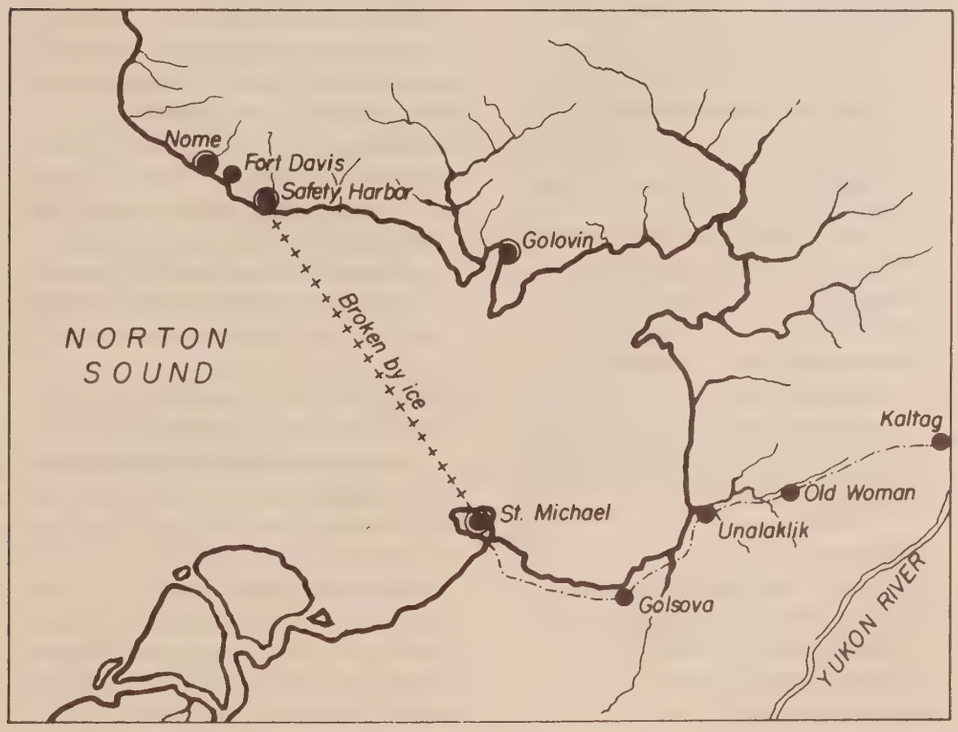
with reference to their practical qualities. He decided to obtain by elimination, substitution or invention some system for Army use which would result in the reliable and successful transmission of messages.

The farsightedness of the Chief Signal Officer had already accumulated information and instruments which facilitated the solution of the problem. In addition to the systematic collection of all published data on wireless telegraphy, no efforts had been spared to supplement these by obtaining information from various inventors and experimenters. In addition, the Signal Corps purchased sample instruments and installations pertaining to every system that seemed worthy of test where a title to the instrument could be obtained for a reasonable price. In this way they acquired essential parts of important systems. Experimental work in wireless telegraphy had also been done by Maj. Samuel Reber, George O. Squier and Edgar Russel, all Signal Corps people, but none of these officers were available for assignment to the work.

For experimental work in connection with perfecting a parmanent plant, Capt. Leonard D. Wildman, a graduate of Stevens Institute of Technology, who had displayed resourcefulness in various phases of field duty, was selected. With full authority to call on Major Reber and Capt. Russel for advice, the accumulated data and instruments were turned over to Capt. Wildman, who began his work by testing the capacity and efficiency of the Braun-Halske wireless transmitter, a duplicate of the plant which operated successfully during the German maneuvers. While this transmitter was not unsuccessful, its maximum capacity for transmission of messages over 63 miles was not entirely satisfactory.

In addition to determining the best type of field wireless apparatus suited to the Army, he was particularly charged with the setting up of a permanent wireless plant which should be able to work successfully over distances exceeding 100 miles.

Map showing the wireless circuit between Nome and Fort St. Michael, Alaska, a distance of 100 miles. This circuit was put into operation by the U.S. Signal Corps in 1903 to replace the cable which was washed out by ice every year.



The chosen field of operation was between Fort Wright, Fisher Island, and Fort Schuyler, New York, 97 miles apart, of which 20 miles was across land. The use of these forts was a factor in the national defense as it established a wireless system over which, in times of great disturbance, a message could be quickly exchanged between the outlying defenses of New York.

With these ends in view, experiments were carried on under Capt. Wildman's personal supervision during the latter part of the year with instruments purchased from the Lodge-Muirhead Wireless Telegraph Company of Great Britain, the Brau-Siemans-Halske Wireless Telegraph Company of Germany, the National Electric Signal Company of Washington, D.C., and from the DeForest Wireless Telegraph Company of New York.

In addition to the instruments furnished by the above companies, experimental apparatus was purchased by the Chief Signal Officer from time to time. Comparative tests were also made between all receivers, responders, and coherers on the market, as well as with many different types of special equipment.

Notwithstanding the popular idea that wireless telegraphy over great distances was an accomplished commercial fact, *none* of the systems investigated proved satisfactory for Army use. (Have times changed?) Wireless telegraph systems seemed to have been developed by their inventors in the laboratory for their own use rather than to electrical and mechanical standards in which a reliable piece of equipment could be placed on the commercial market.

After an investigation of the existing systems, Capt. Wildman formulated, with the approval of the Chief Signal Officer, the following changes

Old Wireless telegraph station at Fort St. Michael, Alaska (*photo courtesy U.S. Signal Corps*).

as being necessary for practical military uses:

1. Eliminate the necessity for an absolute electrical ground.

2. Construct all parts of the apparatus so that in case of the failure of any part, that part can be replaced without elaborate machinery by intelligent unskilled labor. Even in those days they had trouble getting technicians.

3. Replace all adjustments which require a knowledge of mathematics, or experience in manipulation by lettered dials or definite switch positions so that highly skilled operators would be unnecessary.

4. Reduce the necessary height of the antenna wires.

5. Produce a receiver which would not only receive the message intended for it, but which could, by adjustment, also receive any electromagnetic wave.

6. Eliminate disturbances due to atmospheric or static electricity.

7. Avoid, as far as practicable, all dangerous high-potential currents at points where there was a possibility of danger to employees.

8. Provide devices which would protect the instruments and machinery from destructive potentials.

9. Avoid, as far as possible, the use of patented devices and the consequent payment of large royalties.

10. Devise a system which could be easily transported in time of war and which would be capable of transmitting messages under all climatic and topographical conditions.

Extended tests were made on the DeForest System which in its original and earlier forms was successfully operated during the Army and Navy maneuvers in 1902 on Long Island Sound. This was the first time the Signal Corps applied wireless telegraphy to military purposes. During these tests the DeForest system barely covered the Schuyler-Wright course. Under the most favorable conditions a signal could be exchanged successfully, but when there were nearby interfering stations, signal exchange was impossible.

Undismayed by the situation Capt. Wildman applied himself to the problem of supplementing and improving the system, to the point that he solved the problem as far as the needs of the Signal Corps were concerned. His improvements were formulated and patented equally in the interests of the United States, to whom the patents were assigned, and of the inventor.

Although the Signal Corps system was not perfect, it was better than any system previously tried. It was not absolutely unbreakable, it could not be operated by men of a low order of intelligence, and it was not entirely free from interference from nearby stations, nor could it be operated during heavy thunderstorms. Although, from the looks of the tests, it did not meet many of Capt. Wildman's specifications, the U.S. Army

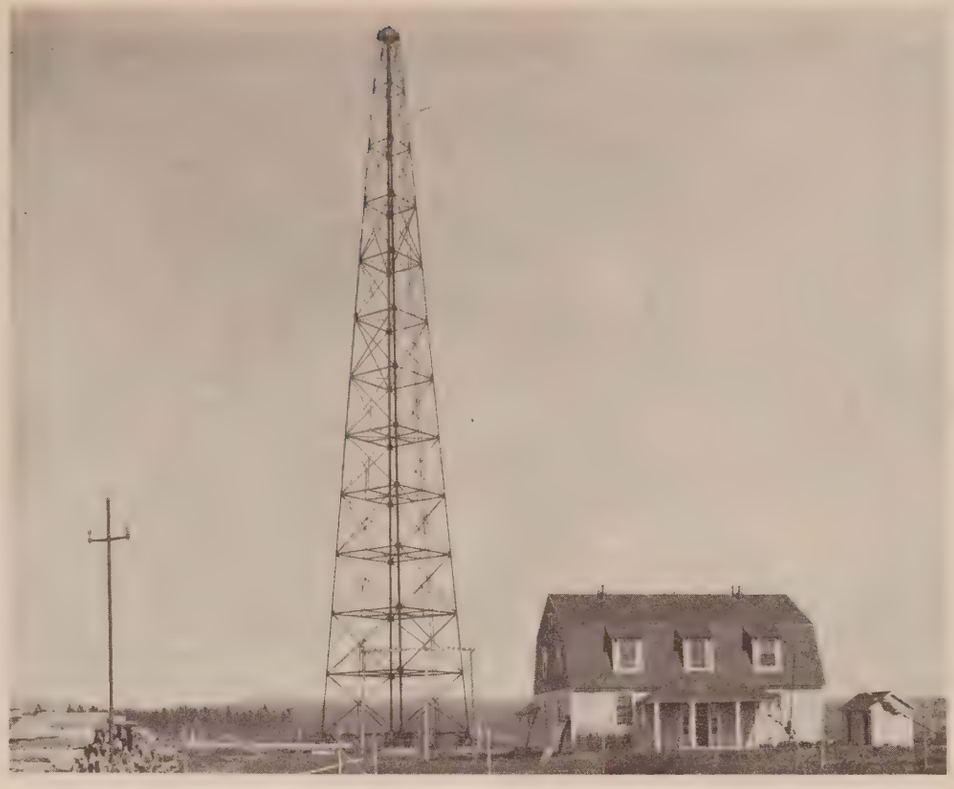
was eager to give it a try in Alaska. A good substitute for a good electrical ground had been found, the operations and adjustments were simple enough, there was only one place within reach of the operator where there was a destructive potential, and the equipment was decided to be repairable enough.

Messages during the tests were sent daily in great numbers over the ninety-seven mile path for five weeks without any apparent deterioration in apparatus or machinery. The experiments furnished a large amount of accurate and valuable data on placement of antenna poles, their rigging, construction, dynamos and their design, transformers and their durability in moist weather, induction coils and their action, the various methods of tuning the antennas to each other, and to the closed oscillating circuits by which they were fed. The tests proved very valuable.

With the exception of the DeForest receiver, the Signal Corps system had no patentable devices other than those invented and designed by the officers and enlisted men of the Signal Corps. As usual, the general public recognized that they had been taken in by the extravagant claims of wireless telegraph experimenters. The public would have to wait for experience alone to prove whether the devices adopted by the Signal Corps performed properly when transferred from a temperate climate to places like Alaska where they had to be operated and maintained by unskilled labor in an unfavorable environment.

It appeared for certain, however, that for Army uses this system was better than anything previously available on the market. Time might disprove the utility of some of the features which seemed promising, but the Army felt it was an advance over other wireless systems then in use.

Capt. Wildman was about to tackle the job of installing a communications system in the cold wilds of Alaska, and acknowledged his indebtedness to Major Reber and Capt. Russel for valuable advice and assistance. Special commendation is due Capt. Wildman for the presistent and skillful manner in which he contributed to the efficiency of the Army in perfecting the Signal Corps system of wireless telegraphy. The improvements were largely his own devices. Two patents were obtained by him for wireless inventions and were assigned to the government. He went on to Alaska, completed his task and wrote the following report to the Chief Signal Officer in 1903:



United States Signal Corps station FD at Nome, Alaska, 1903 (*photo courtesy U.S. Signal Corps*).

Wireless Telegraphy

"The system of Wireless Telegraphy devised by the Signal Corps of the Army in 1899 has been improved in details, but its range of operation is limited. It was deemed advisable to stop experimental work along these lines pending the development of this science by experts in civil life.

In 1901, however, it became a matter of practical importance to the Signal Corps to establish wireless telegraphy over extended distances. A contract was made looking into the establishment of the wireless telegraph by the Fessenden system across Norton Sound from Nome (Fort Davis) to St. Michael, about 110 miles. The contractors failed, however, to make the installation and the contract was revoked.

In view of the failure of the contractor to install the wireless system across Norton Sound, Alaska, and in order to meet the desire of the Commanding General, Department of Columbia, for telegraphic communication with Fort Davis, the Signal Corps took up this problem and is now engaged in an effort to install a system that shall work from St. Michael to Safety Harbor, near Nome, Alaska, a distance of about 105 miles. Experimental work with separate and composite systems is being carried out in Long Island Sound by Capt. L. D. Wildman, Signal Corps, with a view to eventually be working between Fort Schuyler and Fort H. G.

Inside the Signal Corps station FK at Circle City, Alaska, 1909 (*photo courtesy U.S. Signal Corps*).

Wright, a distance of 105 miles, and of which about 10 miles are lowland. For this purpose masts 140 feet high have been constructed, and completed in order to make final tests. Captain Wildman now awaits special motor dynamos and transformers.

Meanwhile to the delay, installations of masts and antennas are now being made at Safety Harbor and St. Michael, so that whatever system proves satisfactory in Long Island Sound, can be utilized in Alaska by 1904 with the suitable sending and receiving apparatus. At both St. Michael and Safety Harbor the permanent plants are now in process of transportation and erection. There are to be at each station two triple masts 200 feet high, between which are to be a suspended fan shaped antenna, consisting of 125 copper wires one-foot apart. The motor power is to consist of a 5 hp gasoline engine and a 3 kW motor dynamo, 60-cycle alternator. At one station will be a transformer, stepping up from 500 to 20,000 volts, and at the other, stepping up from 500 to 25,000 volts. The large Muirhead receivers, which now seem to be the best available type, are to be utilized in this work unless meantime other experiments produce something superior.

Another contract was made with the American-Marconi Wireless Telegraph Company to establish wireless communication between two points in the Tanana Valley where great difficulties were expected in constructing an ordinary telegraph line and in maintaining it satisfactorily, the contract locating the connecting of two points about 164 miles apart with an intermediate station should the Marconi company so decide. It was hoped that this installation would be made by October 1902, but the contractors were not able to install the system last year. They were at work during the summer of 1903, but to this date no success has been reported. It has, therefore, been necessary for the Chief of Signal Officer of the Army to direct the efficient maintenance of the land lines in the lower valley of the Tanana, such action being imperatively necessary in view of the failure of the wireless installations in a reasonable time.

As we stated in the last annual report, the DeForest system of wireless telegraphy was utilized during the Army and Navy maneuvers on Long Island Sound. This year the same system has been used to replace a broken cable in New York Harbor, between Forts Wadsworth and Hancock, and it has worked most satisfactorily over this distance of 12 miles. In this system a motor dynamo of one kilowatt capacity, driven by the power of the post plant at 110 volts, produces an alternating current of 500 volts at 60 cycles. This runs through a two-kilowatt transformer, which steps up the voltage across the spark gap. Messages are received by the telephone and DeForest responder."

Report to the War Department, Washington, D.C., October 3, 1903

"While communication is now heard regularly by telegraph between the civilized world and the Yukon Valley westward to St. Michael, yet restoration of communication with Nome has so far proved impractical. The cable between Nome and St. Michael was so badly injured by ice, some 40 miles of it having been carried away, that its repair meet the urgent recommendations of the Commanding General, Department of Columbia. Efforts are being made, with prospects of success in 1904, to establish communication by wireless telegraphy between St. Michael and Nome across Norton Sound, Alaska, a distance of 108 miles."

October 4, 1904, from Capt. Wildman

"The Signal Corps wireless station at Nome could communicate with a similar station on the Kamchatkca

Coast, but the infertile and sparsely inhabited country thence to the nearest Russian station of Nikolaevisk would render any such enterprise unlikely should it be suggested. As has been stated in previous annual reports, efforts to establish a wireless system across Norton Sound and in the valley of the Tanana, awarded to different companies under public proposals, failed entirely.

The contract to establish communication was abandoned in its primary stages in one case, while in the other the efforts proved fruitless after two or more years trying to construct a permanent line through that section, and it became necessary for the Chief Signal Officer of the Army to undertake through the officers and men of his Corps, a wireless installation across Norton Sound, and work commenced along two lines: First, to install those available and then perfecting the system later. Second, as the short navigable season of four months in Norton Sound rendered it impracticable to carry on experimental work in Alaska, it was decided to establish two stations in connection with the coast defenses of the United States, where they would have a permanent value, and after devising a successful typical plant, transfer its sending and receiving apparatus to Alaska."

The arrangements for the temporary plant were made under the general directions of Major Russel, whose special and important duty in connection with the Alaskan cable installation left him but scant time for arrangements, whose executive duty must necessarily be carried out 2,000 miles away by an assistant not under his personal observation.

In the late summer of 1903 the Norton Sound base was established. At Safety Harbor and St. Michael there were built portable houses, in which were installed engines, batteries and wireless instruments, supplemented by two masts at each station 210 feet high, between which were suspended fan-shaped antennas. These poles, the highest ever erected on the Pacific Coast, and the antenna were installed through the resourcefulness and professional skill of Mr. R. D. Ross, a civil engineer employed for this purpose.

Unfortunately, part of the wireless material failed to reach St. Michael because the steamer it was on, the *Meteor*, was disabled enroute. First Lt. A. T. Clifton, with a selected force of signal-men familiar with wireless work, jury-rigged instruments through which meager wireless signals were exchanged during the winter.

Table 1. Callsigns of some of the early U.S. Army Stations in Alaska.

FB	Fairbanks
FD	Nome
FE	Mouth of the Yukon
FG	Fort Gibson
FK	Circle City
FM	Ft. St. Michael
FP	Petersburg
FQ	Ft. Egbert
FX	Ft. Worden

Meanwhile, experimental work was carried on in Long Island Sound by Capt. Wildman with separate and composite systems. He eventually devised a composite plant, originally based on the DeForest system, but largely modified by inventions of his own. This plant worked with great success between Fort Wright and Fort Schuyler New York. The transfer of the wireless equipment from Long Island Sound to Norton Sound was accomplished by Capt. Wildman during the next summer. The method of installation was such that the installation was easily made.

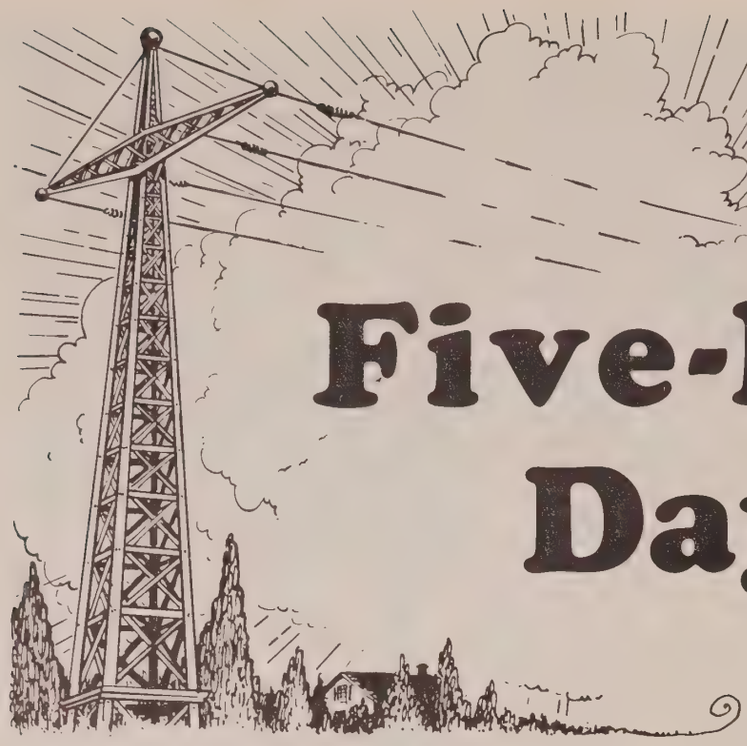
Capt. Wildman, at St. Michael, and Sergeant Treffinger, at Safety Harbor, installed their respective systems in less than two days. Capt. Wildman reported that the wireless material was landed and delivered at St. Michael by noon of August 4, and said:

"At 9 o'clock AM on the 6th, complete messages were exchanged, and the telegram from me at Safety Harbor was released and set forward. No serious trouble of any kind was experienced and every part of the machinery worked in a perfectly satisfactory manner. Since that time we have been pushing the machinery about 20% overloaded in order to see if it could be broken down. The signals are fine and louder than I have ever heard them at either of the stations when at Schuyler or Wright. The operators have no difficulty in reading the messages while the relay is working in the same room and with the engine running in the next room and men walking about and talking in an ordinary voice anywhere in the house."

On August 17, 1903, the Nome station was thrown open for commercial business with the rest of the world, and the wireless section of the Alaskan Telegraph System was an everyday adjunct of the electrical appliances of the twentieth century. It daily transmitted the entire telegraphic business of the Seward Penninsula. In one afternoon 5000 words were exchanged between Safety Harbor and St. Michael.

Through the professional skill of Capt. Wildman and his subordinates, the Signal Corps had started operating the longest wireless section network of any commercial telegraphy system in the world. Some of this early equipment was still functioning as late as 1922, in Craig, Alaska. The old 3-kW transmitter was still run by the gas engine, and the transformer, glass-plate condensers, straight open spark gap with cup-like electrodes and plain helix were still going after all those years. Wireless proved itself easier to maintain than telegraph wires.

ham radio



Five-Meter Days

BY WILLIAM ORR, W6SAI

Buried and sleeping beneath the bombast of soap opera, violence, talk shows, and noisome commercials on television channel 2 lies the old 5-meter amateur band.

Removed from the Amateur Service in 1947 by the learned decision of those who should have known better, the 5-meter band was replaced by the almost useless 6-meter band, which was to serve as a *guard band* for the splash-over from the powerful channel-2 TV transmitters.

Yes! Looking back to the Golden Years of amateur radio, the 5-meter band combined the tantalizing prospect of inter-continental DX with the comfortable and friendly local contacts of a wide group of "ultra-high frequency" operators who used equipment unknown to the majority of today's amateurs. An ideal band for the beginner in 1936, the 5-meter band was chock-full of inexpensive, home-built station equipment that afforded untold pleasure to those lucky amateurs who were fortunate enough to have experienced the beginning of vhf operation typified by today's sophisticated solid-state gear, multi-element beam antennas, and mountain-top repeaters.

The way it was

Interested in getting on the air, young fellow? You have your Class B (General class) license? (Of course, no Novice or Technician class licenses existed in those days.) Well, then, for about fifty dollars — or less if you have a good junk box — you can be on the air on the 5-meter band with a radio-telephone station!

Of course, in 1936 not all enthusiastic, would-be amateurs went to the bother of getting an FCC license. Untold

The Beginner's "ultra-high frequency" Transmitter of 1936. The modulated oscillator reigned supreme on the old five-meter band in pre-war years. This 1977 duplicate of the author's original transmitter uses isolantite-based 112As in a push-pull TNT (tuned-not-tuned) circuit. Grid modulation was used for phone. The little oscillator was built in a few hours from authentic parts, and provided a 5-watt carrier — right in the middle of today's TV channel two! The isolantite based 112As? I ran across a friend who had a whole box full of them in his attic — undisturbed for over thirty years!

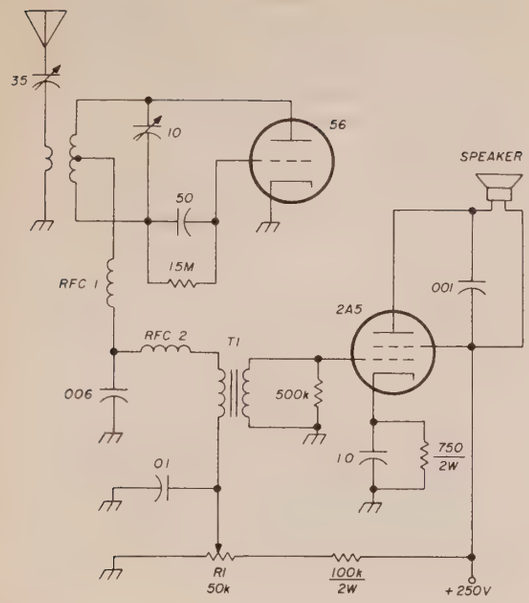


Fig. 1. The "rush-box" receiver. The simple two-tube set is full of tricks, as the author learned when he built his 1977 replica of the 1936 receiver. Placement of parts in the detector circuit is critical and hand-capacitance effects are disturbing. The rf chokes have to be tried experimentally until two are found that eliminate audio howling caused by the quench frequency passing through the audio transformer into the audio amplifier. The resistor across the secondary of the audio transformer is also required to prevent fringe howl, a peculiar form of audio distortion noticed when the detector is just on the verge of oscillation. The capacitor from plate to screen of the audio tube prevents the speaker leads from picking up the detector radiation and coupling it into the audio stage. The plate bypass capacitor (0.006 μF) in the detector stage is chosen for smoothest superregeneration. The series capacitor in the antenna lead is adjusted so that antenna resonance does not pull the detector stage out of oscillation. Otherwise, there's nothing critical about the receiver.

numbers of bootleggers flourished in the metropolitan areas, aided by the number of cheap, easily purchased "UHF" transceivers sold by numerous radio dealers. Unlike today, however, when the majority of unlicensed radio operation comes from hyper-active CBers who move into unauthorized bands, the bootlegger of the 1930s clung to the ham bands. He was usually a young fellow, studying for his ham ticket, who let his enthusiasm run away with him. In general, most of the bootleggers eventually settled down and became amateurs, but the fact remains that a great deal of unlicensed operation took place on the old 5-meter band. The combination of cheap, easily built (or bought) equipment and the lure of talking across town seemed too great for many. Most amateurs accepted the brash upstarts with an easy tolerance. Indeed, in some areas there was no one to talk to except a bootlegger, so sparsely occupied were these ultra-high frequency bands.

Around the big cities, however, 5-meters was jumping with signals in 1936. Modulated oscillators and super-regenerative receivers were universally used, and rare indeed was the crystal-controlled transmitter and superheterodyne receiver. The state-of-the-art just hadn't moved that fast in those early days.

Interested in 5-meter work? Okay, let's go! The receiver will be a two-tube superregen and the transmitter a modulated oscillator. We'll tackle the receiver first (**Fig. 1**). Unknown today to most amateurs, the "rush box" was a widely used 5-meter receiver in the 1930s. The superregen is essentially a regenerative detector with a means provided to rapidly switch the circuit in and out of oscillation. The frequency at which the detector is switched (quenched) varies with the frequency being received, but is generally between 50 and 150 kHz. This action considerably increases the sensitivity of the oscillating detector so that the usual background noise is greatly amplified when no signal is being received.

The simplest superregen (shown here) is arranged so as to produce its own interruption-frequency oscillation without the aid of a separate quench stage. The detector tube quenches itself out of oscillation at a rapid rate by virtue of the high value of grid resistor (15 megohms) and the proper size plate-blocking capacitor.

Considering that only one

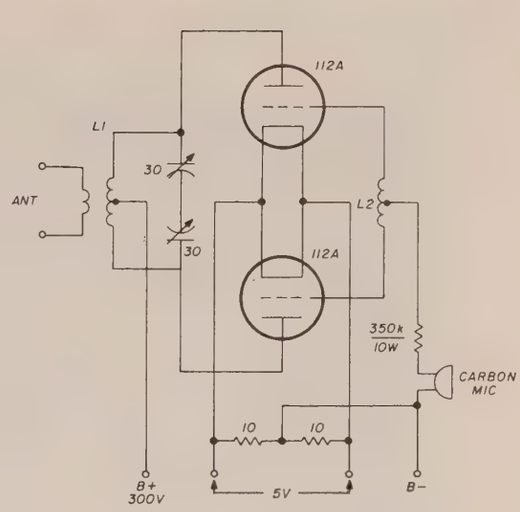
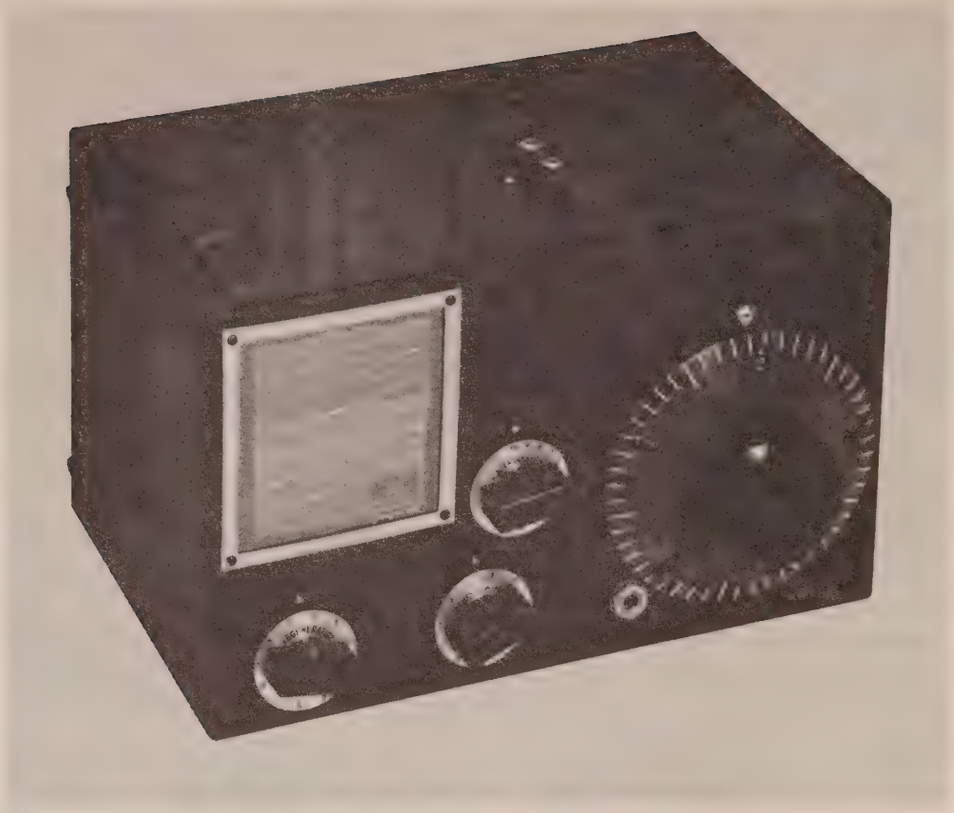


Fig. 2. The 5-meter modulated oscillator circuit. This simple circuit was very popular in the late 1930s for local ragchewing. The oscillator was grid modulated by a carbon microphone, which provided a combination of amplitude modulation and lop-sided frequency modulation. When the operator grabbed the microphone, the frequency of the transmitter shifted 20 or 30 kHz. But since the super-regenerative receiver had a selectivity on the order of several hundred kilohertz, this effect went unnoticed. The phone signal from this little oscillator sounded surprisingly good in a rush box receiver. Using a dipole antenna, the operating range of the little transmitter was about 30 miles. Plate modulation provided a much more intelligible signal and eventually most users switched to that form of modulation. A pair of push-pull 45s would do the job at low cost.

tube is used, this simple circuit provides good weak-signal detection, good agc (automatic-gain-control) action, and is remarkably free from overload. Unfortunately, the superregen detector has poor selectivity and radiates a broad, rough signal at the same time it is receiving. Operating was pretty miserable in areas of high ham activity when a number of rush boxes were being used. On the other hand, it was always possible to determine if there was any activity on the band; you could always hear the nearby receivers tuning back and forth!

The receiver shown, one of the popular early circuits, uses a 56 triode as a superregen detector and a 2A5 pentode audio stage. A small magnetic speaker is directly driven by the 2A5. Sensitivity and superregeneration are controlled by the potentiometer



The National 1-10 vhf/uhf receiver, first introduced in 1936, tuned from 30 to 300 MHz and covered the 5-meter, 2-1/2-meter, and 1-1/4-meter bands then available to amateurs. This popular receiver featured an rf amplifier stage followed by a superregenerative detector and two stages of audio.

in the plate circuit and by the degree of antenna coupling.

The five-meter transmitter

Like the receiver, the transmitter is built on a breadboard chassis. The circuit is simplicity in itself (**Fig. 2**). Two receiving-type triodes are used. Some amateurs used 45s or 171As, but the best tube seemed to be the 112A. This tube could grind out several watts at 5 meters when run from a 300-volt plate supply. If the builder were lucky, he could buy a pair of matched, isolantite-based 112As suitable for "ultra high frequency" oscillator service. The pair shown in the photograph was made by Raytheon. The less-affluent ham had to use ordinary bakelite-based tubes. In reality, there was little difference in performance, especially if the bakelite base was slit by a hacksaw between the grid and plate prongs!

The push-pull oscillator could be plate modulated in the normal fashion, or could be grid modulated with surprisingly good results. Grid modulation was accomplished by simply putting a single-button carbon microphone in series with the grid resistor. This provided a combination of grid modulation and frequency modulation that sounded quite good on the rush-box receiver. The amateur with a few extra dollars built up a plate-modulation system with a pair of 45 tubes in push-pull, providing nearly 5 watts of audio power.

When run at 12-watts input (300 volts at 40 mA) the little oscillator provided a carrier power of about 5 watts, with everything running cool.

Unfortunately, the combination of amplitude and frequency modulation, plus the inherent instability of the oscillator, produced a signal that took up about 100 kHz of spectrum space! In addition, as the oscillator warmed up, the frequency would drift lower as the various components expanded; no matter. The five-meter band was 4-MHz wide (56 to 60 MHz) and no one really seemed to know where the band edges were!

The QRM situation

In a large metropolitan area the five-meter band was jammed, even though occupancy was relatively light, compared to today's operating standards. The wobbly, broad signals combined with the poor selectivity of the rush-box receiver meant that five or six loud signals completely filled the band. And, sandwiched among the signals, the weaker signals of other rush-box receivers filled the in-between spaces on the dial.

A case in point: I was on 5 meters in New York City in 1936. Some of the advanced stations had crystal-controlled transmitters and sensitive superheterodyne receivers, but they were far outnumbered by the modulated oscillators and rush boxes. One night a local station heard a W4 in the Washington, D.C., area on 5

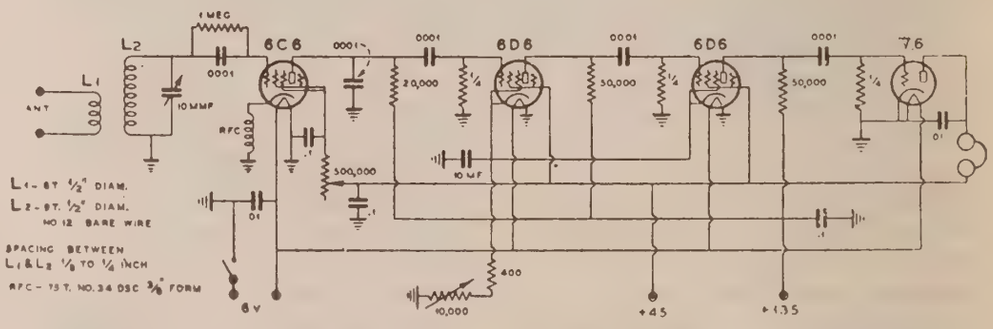


Fig. 3. The Frank Jones resistance-coupled superhet receiver for 5 meters. This simple receiver solved most of the problems inherent in the superregenerative receiver. An oscillating mixer stage (6C6) feeds two stages of resistance-capacitance coupled i-f amplification. Circuit values are chosen so the i-f response peaks at about 50 kHz. Detector is a 76 triode (circuit from first edition of the *Radio Handbook*.)

meters, which was outstanding DX in those times. Eager to hear the W4 myself, I tuned around with my rush box. When I inadvertently hit the frequency of the W4 and could hear him weakly, the rough emission from my rush box wiped out the signal of the W4 all over the New York City area! Believe me, I certainly heard about that indiscretion the next day when the big DXers deduced who the upstart was who ruined their DX contact!

However primitive, the modulated oscillator and rush-box receiver remained supreme until the amateur bands were closed by war in 1941. But by 1940 most amateurs realized that the days of the broad signal were past. Indeed, many of the new receivers could not pass the signals of the unsteady, wobbly oscillators.

The R-C superheterodyne

The immediate problem of a good, inexpensive non-radiating receiver was solved almost single-handedly by one of the most famous vhf operators of all time: Frank Jones, W6AJF. Going back to the 1920s, Frank resurrected the autodyne detector circuit and used it in a simple superheterodyne receiver (**Fig. 3**). This amazing set had no i-f transformers and a single tube served as mixer and local oscillator. In this particular circuit, the 6C6 tube was the mixer/oscillator, the oscillation taking place about 50 kHz from the received signal. The difference signal of 50 kHz was then passed through the i-f amplifier which employed resistance coupling instead of transformers. The value of resistors and capacitors was chosen to provide an i-f passband from about 20 kHz to 100 kHz, with maximum gain peaked at 50 kHz. The passband, then, was 80 kHz or thereabouts; ample for all but the most badly overmodulated oscillators.

Since the intermediate frequency was so low, the image signal was as loud as the primary signal, and all signals appeared at two closely spaced spots on the dial. In this case, the receiver was mistuned about half a dial degree, to the point where the audio was the loudest. And that's all there was to it!

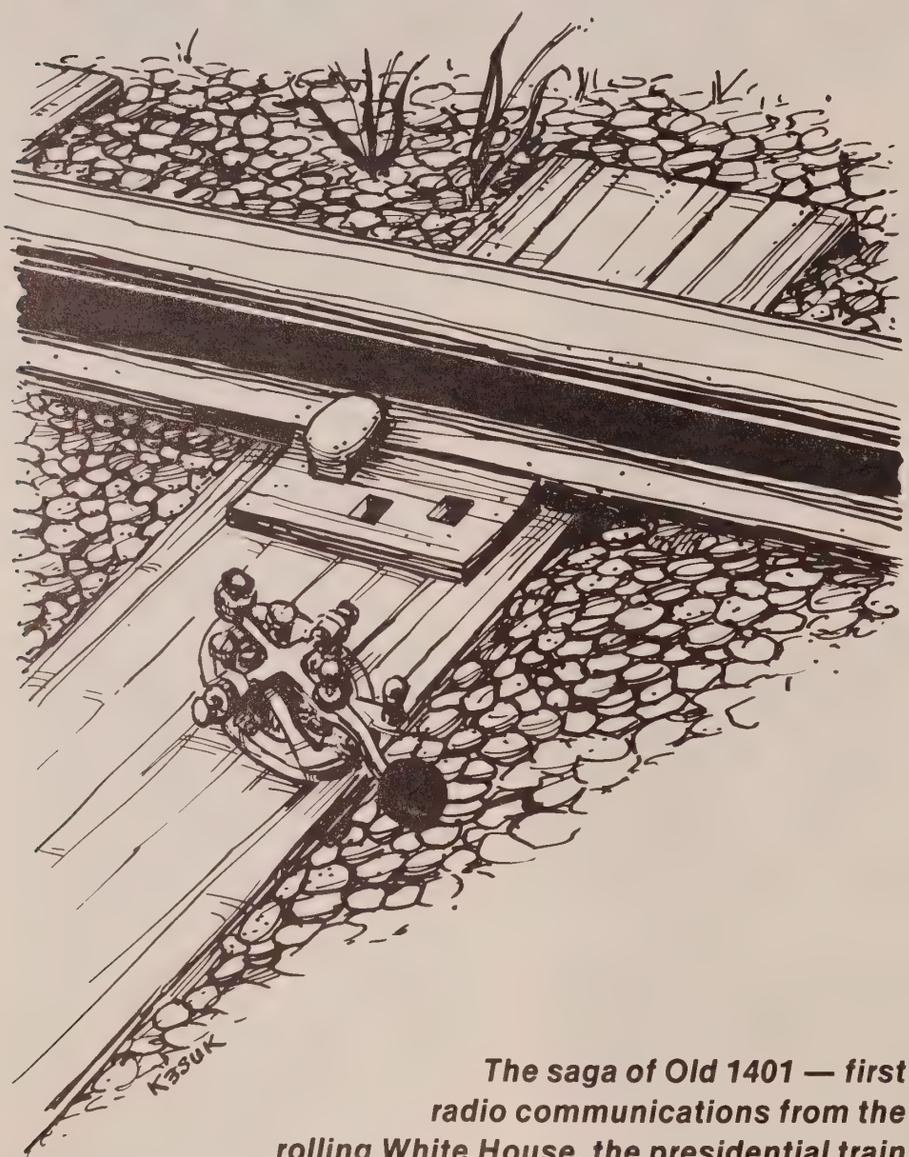
While this interesting design was developed and published in March, 1935 (*Radio* magazine), the idea did not really take fire for a year or so. But by late 1936 or early 1937, simple R-C superhets were in common use on 5 meters, and the day of the modulated oscillator was drawing to a close. Oscillator-amplifier transmitters with their relative freedom from modulation instability were becoming popular, and many of the more advanced amateurs were already using crystal control for the highest degree of stability. Acorn tubes were on the market, and high-frequency superheterodyne receivers were on the horizon. In a few short years the simple and unassuming "ultra-high-frequency" modulated oscillator and rush-box receiver were to be relegated to that special Valhalla of the mind where such cherished objects linger only in memory.

HRH

One of the first amateur vhf handbooks was Frank Jones' *5-Meter Radiotelephony* which was published by *Radio* magazine in 1934. If an amateur was active on 5 meters in the 1930s, you can bet he had a copy of this book on the shelf!

BRASSPOUNDING on wheels

BY CHARLES W. CLEMENS, JR., K6QD



The saga of Old 1401 — first radio communications from the rolling White House, the presidential train

Many of the operating stories we read in the amateur publications are about sea-going brasspounders. This one is about a brasspounder who rode the rails. Back in the summer of 1942, I was working my shift at WAR in Washington when an officer walked up behind me and tapped me on the shoulder. He told me to go pack my clothes for a trip to a warm climate. That was how I started as the first CW operator at the White House.

I learned that the White House had a Signal Corps detachment that now had the task of providing communications on a continuous basis between the Presidential Train and the White House. I believe this was the first time such a thing had been attempted in the United States. The Washington end was to be handled by the big War Department communications center, WAR; the remote end by the train plus relays, when necessary, from local stations along the way.

My first trip on the communications car, Old 1401, was the second trial run for the car. On this trip I went with the detachment commander, Col. Beasley; a radio operator recently made a Lieutenant, Lt. Greer; a civilian engineer from the War Department named Jack Kelleher; a radio maintenance man named John J. Moran; and a Secret Service man named George J. McNally. It is interesting to note that all of us were amateur radio operators. We went from Washington, D.C. to New Orleans and returned with our car in a regular passenger train, coupled between two baggage cars.

Old 1401 was a combine car. That is, she was half baggage and half passenger. She had been built for the Baltimore and Ohio Railroad in 1914. At the time I first met her, all

identification on her sides had been painted out. Her number was her only identification, and it was painted in beautiful gilt over the entrance at the passenger end.

Inside, a couple of front seats had been removed and an operating table installed in their place. One operating position was located on each side of the aisle between the seats. Each position had a Super Pro receiver and a BC-342.

The BC-342 was a new model at that time, designed for use in tanks and other rough riding vehicles. This receiver was installed on shock mounts, but my first trip proved that the best way to mount equipment on the train was to bolt it down solidly. Installed in this manner, the whole car moved as one unit and the receivers worked beautifully. There was, however, a modulation on the received signals imparted by the train's vibration. But this was better than having the tubes jump out of their sockets — which they frequently did when the equipment was on shock mounts (the tube clamp was not yet in common use).

Telegraph lines alongside the tracks provided a lot of clicks that made it difficult to copy poor signals. However, we didn't have too much trouble with this problem except in the Southwest. The transmitter was a BC-447, running about 300 watts.

The clearance requirements for railroad cars prohibited using a real antenna. Ours was a wire inside an insulating tube mounted on standoffs about six inches above the metal roof of the car. This was later changed to a copper tube, the same size as the insulating tube, with much better results. Our frequency complement ran from 3 MHz to 17 MHz.

I was supposed to contact a number of Army stations along the way, none of them more than a couple of hundred miles from our route. As might be expected, results were poor and it was decided to contact WAR in Washington direct. Successful contacts were made from New Orleans and on the way home. The only real difficulty came when we were close to Washington. At that time, it was difficult to receive WAR on any frequency. Overall, however, our results were encouraging and we were assigned the task of accompanying President Roosevelt on his swing around the country visiting military bases and aircraft plants.

To my knowledge, this big trip was the first time continuous communications had ever been attempted between the presidential train and Washington. We contacted WAR in the eastern half of the country and WVY (San Francisco) or WVD (Seattle) in the western half. Results were excellent. In fact, our volume of traffic was so high that it was necessary to pick up an additional message clerk in Seattle, our first major stop, to handle the paper work.

To make a long story quite short, I worked six years on the Presidential Train, traveling with Presidents Roosevelt and Truman in the United States, Canada and Mexico. We logged well over a hundred thousand miles.

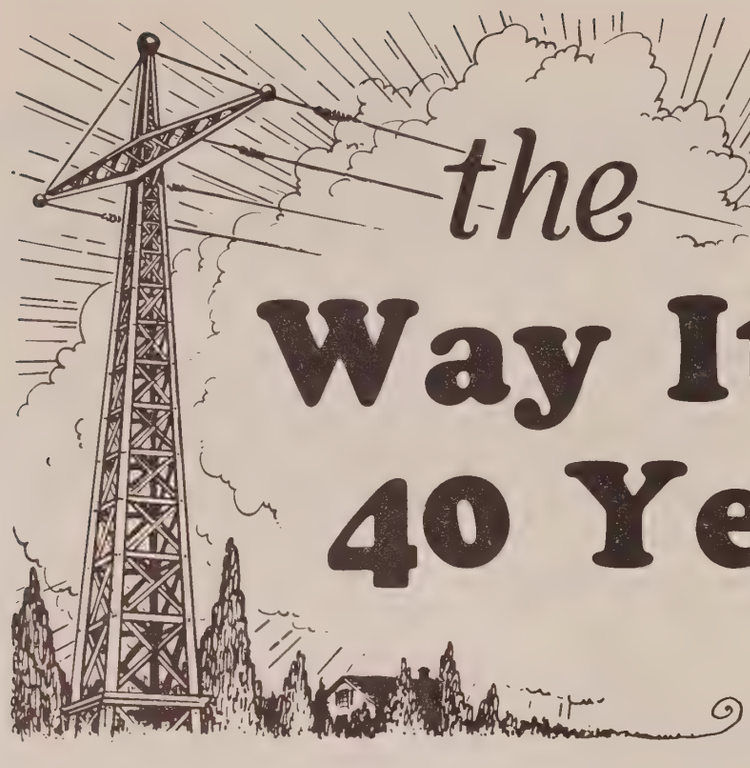
Equipment and facilities were improved over those years, and when I left Old 1401 in 1948, the car had a small operating room, a code center, a small bunk room with four bunks, a lounge room, and the baggage half of the car packed with equipment. We had two BC-339 transmitters for our message traffic. These were fixed station Federal jobs that loafed along at 1500 watts in radio-teletype service and could easily run 3-kW on CW.

A single BC-610, a 500 watt a-m transmitter, was available for occasional broadcast services. We also had a 250-watt Motorola fm transmitter for guard radio service. On the receive side, we had the two BC342s I mentioned earlier, two Super Pros, a big Navy receiver whose type number I can't recall, two Western Electric CV-31 teletype converters and a single teleprinter.

We also had a telephone switchboard that provided service throughout the train. The telephone cable permitted us to provide music throughout the train and intercom service, too, if it was desired.

Power was provided by two 25-kW diesel generators. Only one of these was required, and we switched them every 24 hours. We also had two 100-amp battery chargers to charge the train's batteries when we were parked away from railroad terminal facilities, and two converters to provide ac power from the batteries to run our receivers in standby.

Today, the train is no more. Old 1401 has been retired and the President's car — Ferdinand Magellan — is gone, too. The small detachment I knew has grown to the White House Communications Agency. Their responsibilities have grown a great many times over, but I'll bet they aren't having any more fun working assignments today than I did when Old 1401 was my home on wheels. **HRH**



the Way It Was — 40 Years Ago

BY WILLIAM ORR, W6SAI

The old timers of today were beginners in 1937 and the wonderful world of amateur radio was just as interesting, confusing, and exciting then as it is now. Today's newly licensed amateurs can gain comfort and knowledge from the thought that the beginner opens the door to radio communication in 1977 in much the same manner as he did in 1937. The names and equipment may be different, but the spirit of amateur radio remains the same.

Old Timers vividly remember their first equipment, their first antenna, and their first contact. And much of the memory is preserved in some of the old radio magazines. The following is an excerpt of material of interest to the beginning amateur of 1937, as seen through the pages of *QST* and *Radio* magazines.

1937 was a good year for amateur radio: About 47,000 amateurs were licensed, the sunspot count was reasonably high, and the 10-meter band was exciting newcomers with transoceanic contacts. The 15-meter band, of course, was not allocated to amateurs at that time but many amateurs trying to get their home-made transmitters working on 10 meters unknowingly ended up on 15 meters and wondered why they could not raise the loud 10-meter signals they heard on their receivers!

QST magazine is the official organ of the American Radio Relay League and has been published continuously since December, 1915 (except during World War I). *Radio* magazine , originally devoted to broadcast reception, gradually changed to amateur radio during the years 1932-1934. It ceased publication as an amateur magazine in 1942.

Taylor Tubes Win!
HELLO PALS!
MEET THE NEW AMATEURS CHAMP. KID-TAYLOR TUBES HE HAS MORE SOCK THAN ANY OTHER TUBE BATTLER IN THE AMATEUR BANDS.
KID TAYLOR TUBES
QRM
The Taylor Combined Catalog and Handbook—Free—tells you how to lick Ol' Man Q R M in one easy lesson. Send for it or get it at your favorite Distributor!
TAYLOR TUBES, INC. 2341-B Wabansia Avenue, Chicago, Illinois

Fig. 1. Among the many manufacturers of vacuum tubes for radio amateurs, the Taylor Tube Company was well known for rugged, low-priced tubes. Taylor advertisements often featured the artistry of Otto Eppers, W8EA, the ham radio cartoonist of the 1930s. W8EA also drew cartoon QSL cards which are collector's items today. While the Taylor Tube Company no longer exists, the ceramic-based Taylor tubes are hot collector's trophies today among conoisseurs. Ask any old timer about the T-55 or TZ-40 tubes!

Broadcast interference caused by 160-meter phone operation was a headache, but television interference was quite unknown, as W6AAR reported in *Radio* magazine, "The television picture is still rather cloudy. There would have been a hundred amateurs and at least a dozen commercial stations on the air with high-definition pictures at the end of 1936 had the pick-up tubes been available. The only consistent television picture on the air has been the Don Lee Los Angeles station which used mechanical scanning." And in the same magazine, David Sarnoff of RCA predicted that, "While the problems of television are formidable, I firmly believe they will be solved."

However, the 1937 newcomer probably didn't even read these prophecies as he was too intrigued by the articles and advertisements in the magazines. One of the first ones to catch his eye was the *Taylor Tubes* ad featuring a cartoon by Otto Eppers, W8EA (**Fig. 1**). The Taylor Tube Company was fighting it out with RCA and Eimac for the lucrative amateur market, along with Raytheon, all of who had a full stable of inexpensive tubes to separate the amateur and his dollar.

In those dear, dead days, the great majority of amateurs were crystal controlled on one or two frequencies. The accepted method of getting a contact was to call CQ and then announce that you were "tuning the band for a call." A reply might come at any frequency in the band and rare indeed were the contacts that had both stations operating on the same frequency. Smart DX operators, however, had learned the value of the vfo (variable frequency oscillator) and were

able to zero in on a DX station, thus greatly enhancing the chance of a come-back to their call.

QST, January, 1937

Only 25 cents, the red-and-black magazine featured an article on building an oscilloscope with the new one-inch 913 picture tube. Since the oscilloscope has never found its way into the amateur's heart, it is a sure bet that the beginning amateur hurried past this article to find more interesting fare. Sure enough, Walter Roberts, W3CHO, had a short article on an inexpensive 160-meter phone transmitter for local rag chews that was just the ticket for the beginning amateur to build (**Fig. 2**). The 160-meter band was the so-called "beginners band," because it was the only high-frequency phone band available to the newly licensed amateur (aside from 10 meters, which was thinly occupied). This 160-meter phone transmitter operated directly from the 110-volt line and provided a fully modulated carrier of about 2 watts. W3CHO assured the reader that with a suitable antenna, contacts as far out as 20 miles were duck soup, and a strong signal had been reported as far as 70 miles away.

The little transmitter used five inexpensive tubes, readily available from any radio repair shop. No meter was provided, the thrifty designer providing pin jacks at the proper point in the circuit whereby the lucky owner of a milliammeter could plug it in for measurements.

The circuit is of some interest, as it is of a type rarely seen today. The rf portion consisted of a 76 triode as a crystal oscillator inductively coupled to a 43 pentode as an rf amplifier. Similar tube types were used as a microphone amplifier and a series-connected cathode modulator. An amplitude-modulated carrier was the result.

The transmitter used a double-button carbon microphone whose voice-activated diaphragm varied the resistance of carbon cups. This was a widely used instrument, soon to be replaced in modern ham stations by the crystal microphone. A 25Z5 double diode provided plate potential as well as bias voltage for the modulator tube.

A casual remark in the *QST* text mentioned that one side of the primary line (the grounded side) was attached to the negative of the equipment, but left the reader up in the air as to the method of determining the ground connection in his house wiring. An error in wiring could thus possibly leave the negative circuits of the little transmitter "hot" to ground. The possibility of a shock was minimized by "floating" the chassis with respect to dc ground, much as was done in the old ac-dc broadcast receivers of that same period.

The dreamer could turn to the *How's DX* column in *QST* and learn that DX was good and that a few lucky amateurs had been able to contact EA4AP in Madrid, said to be operated by newspapermen at the American Embassy who were covering the Civil War in Spain. The big excitement on 20 meters, however, was the appearance of EL2A, the first station in Liberia who boomed in on 20 meters with 500 watts and an *eight element* Yagi!

The 10-meter band was hopping with DX, including loud signals from Chinese

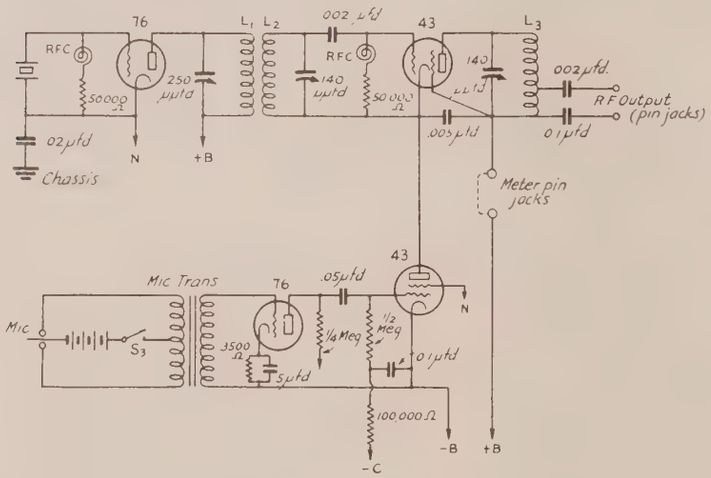


FIG. 1—CIRCUIT OF THE R.F. AND AUDIO SECTIONS OF THE 160-METER RAG-CHEW 'PHONE

L_1—Crystal oscillator plate coil, 35 turns No. 22 d.c.c., 1⅛-inch winding length.

L_2—Final grid coil, 45 turns No. 26 d.c.c., 1⅛-inch winding length.

L_3—Final plate coil, 55 turns No. 20 d.c.c., 2⅛-inch winding length.

All coils are wound on 1½-inch diameter forms. L_1 and L_2 are wound end-to-end on the same form with ⅜-inch separation between coils.

Switches S_2 and S_3 are a single d.p.s.t. toggle.

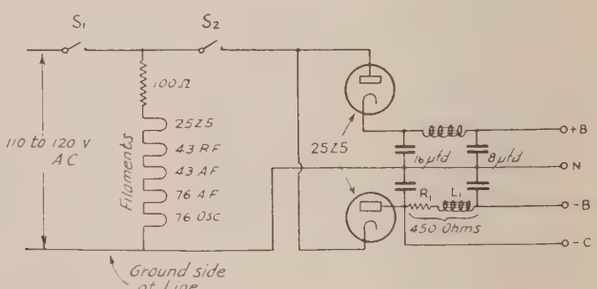


FIG. 2—THE TRANSFORMERLESS POWER SUPPLY CIRCUIT

A total resistance of approximately 450 ohms was found correct for L_1 and R_1 in series, but it may be preferable to use a variable resistor for R_1 and adjust bias to make the d.c. voltage drops between plate and cathode of each 43 about equal when the final amplifier is excited and tuned but not modulated.

Fig. 2. A flea-power a-m phone for 160 meters using 5 tubes was featured in the January, 1937, *QST* magazine. Operating directly from the ac power line, the crystal-controlled transmitter delivered about 2 watts carrier power, using a series modulator. A double-button carbon microphone was featured, along with a two-stage audio amplifier-modulator. The tube filaments were in series for direct connection to the power line. A transmitter of this type could be made of parts taken from a defunct broadcast receiver. Drawings copyright 1936 by The American Radio Relay League, Inc., reprinted by permission.

stations XU8OP, XU8MT, and the first QSO between England and Brazil on 10 meters was recorded.

Buy a good amateur receiver? There were many on the market and you could trade-in your old receiver or get "time sales" for your new receiver with only a six-per cent interest charge at *Henry Radio Shop* (**Fig. 3**). The more affluent amateurs were greatly interested in the announcement of the new Hammarlund *Super-Pro,** a state-of-the-art receiver whose life span lasted from 1937 until at least 1950, a near-record for an age when electronics was making giant strides forward (**Fig. 4**).

And, finally, a *QST Ham-Ad* informed the new amateur that he could get the "world's finest QSL cards," printed by W8DED, who is still advertising QSL printing service in *QST*, 40 years later.

Fig. 3. Henry Radio Shop (now Henry Radio) offered "times sales" at a 6% interest charge in 1937. The newcomer often bought the Hallicrafters *Sky Buddy* receiver at $29.50 or the *Sky Chief* at $44.50. More affluent amateurs bought the *RME-69* at $134.90 and a few dreamed of owning the yet-to-be-announced *Super Pro* receiver at $238.14. To match the 1937 prices to 1977, multiply the above by five.

WE OFFER—

Specialized personal service of genuine value that is not available from other jobbers.

Time sales of all receivers and transmitters with terms arranged to suit you and 6% interest charge. We finance our own paper.

Complete stock of all amateur apparatus at net prices. Export orders given individual attention too.

TRADE IN YOUR RECEIVER

All receivers shipped on ten day trial. You need send but $5.00 with order, balance C.O.D. These receivers in stock:

RME-69s complete	$134.90
DB-20 signal intensifiers	39.95
The new 1937 Breting 14s	99.00
RCA ACR-175s	119.50
The new 1937 Super Pro when ready	238.14
Hallicrafters Sky Buddys	29.50
Hallicrafters Sky Chiefs	44.50
Hallicrafters 1937 Super Skyriders S-11	89.50
Hallicrafters Ultra Skyriders S-10	99.50

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All Collins, Harvey, RCA, RME, All Star transmitters at net prices. Sold on terms to suit you with two years to pay and 6% interest charges.

HENRY RADIO SHOP

211-215 North Main Street BUTLER, MISSOURI

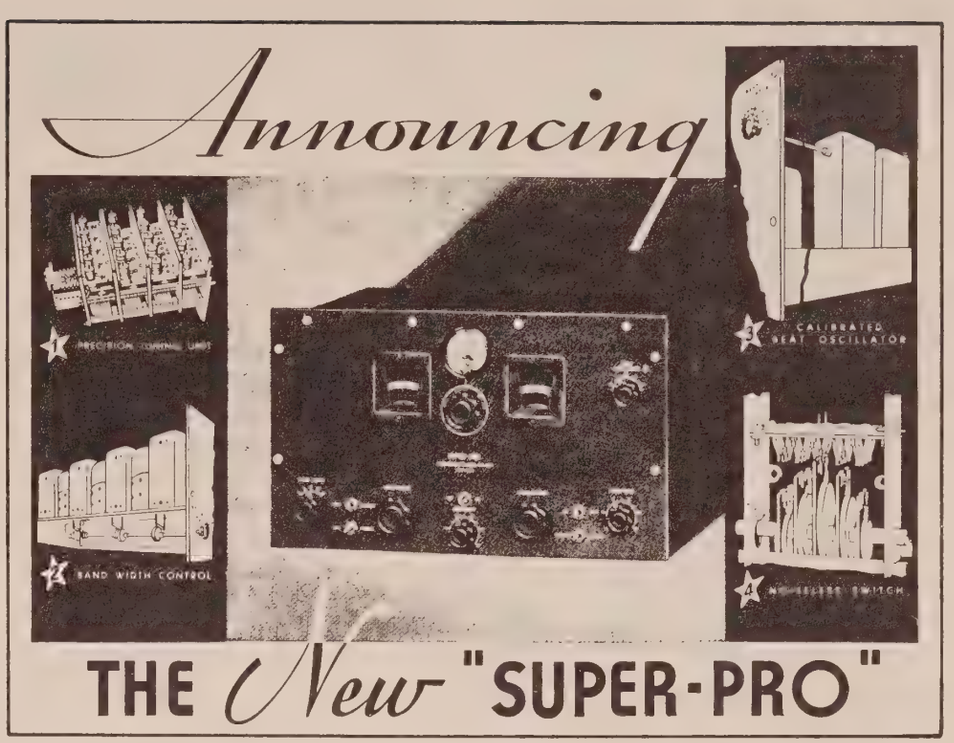


Fig. 4. The famous Hammarlund *Super Pro* receiver was announced in 1937. Featuring two tuned rf stages and a precision coil turret, the *Super Pro* design lasted well until after World War II. Thousands of these receivers were built for the military during the period, 1940-1946, and the popular BC-779 was used in many ham shacks until the advent of single sideband in the early 1950s.

Radio, January, 1937

Radio magazine, a mildly iconoclastic publication, was published on the west coast for a number of pre-war years. The January, 1937, issue was the annual edition, which ran to a fat 194 pages, chock full of advertisements and articles for the advanced amateur. The beginner was not left out of the picture, however. A fine article by Bernie Ontiveros, W6FFF, described a 20-watt, six-band transmitter that used the newly developed RCA beam power tube, the 807 (**Fig. 5**). Using plug-in coils and six tubes, the little rig was built into a wooden relay rack and boasted a dc milliammeter that could be plugged into various circuits to monitor critical current.

The rf section consisted of a glass 6L6 as a regenerative crystal oscillator, inductively coupled to an 807 as an amplifier. Circuit *connoisseurs* familiar with the 807 will no doubt raise their eyebrows at the simple circuit, as no parasitic suppression was included. But then, since no TV stations were really on the air, who worried about parasitics?

The audio section consisted of a 6A6 twin-triode, parallel-connected as an amplifier for a carbon microphone, and two 42 pentode tubes connected as a class-AB push-pull modulator, featuring battery bias. The whole transmitter was run from a single, heavy-duty power supply which used a "broadcast replacement" transformer and an 83 mercury vapor rectifier. Bernie assured the builder that,"...the quality on voice will be almost as good as with the more expensive type microphones."

The DX column of *Radio* sadly reported that QSL cards had been returned from OS1BR (presumably in Suez, Egypt) marked *Uncorect Adres* and that W9WCE was working

*Old- and not-so-old timers will fondly remember the *Super-Pro* as the war surplus BC-779 receiver that graced many ham shacks during the years immediately after the war.

plenty of 20-meter DX with 45 watts. W5EOW contributed the following poem for posterity:

The DX Contest

Every morning about half-past four,
I slip on my pants and sneak
out the door,
Out to the shack I run like heck,
To warm up the tubes and get a
frequency check.

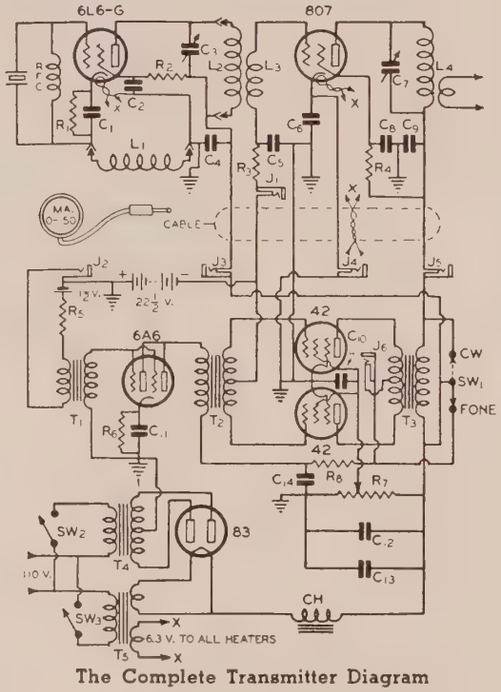
Listen 'bout an hour, don't hear
a thing,
Haven't worked a furriner since
way last spring.

Hear a CQ, my heart gives a bound,
'Til he signs W5, just across town,
Now some folks say there ain't
no Hell,
But they ain't hams, so they
can't tell,
When fall rolls around I take
another chance,
And buy 66's instead of new pants,
Buy a new receiver when the old
one's best,
But I'm durn sure ready for the
next contest!

Yet, the uncomplicated days of ham radio were slowly coming to a close. By the end of 1937 RCA placed a two-page advertisement in *QST* announcing the new television Kinescope picture tube and stated that, "...Television was out of the laboratory." *QST* also featured a long article about FR8VX, Prince Vihn San, exiled from French Indo-China (Viet Nam) because of troubles caused by the local movements for independence. Isolated on Reunion Island, the Prince evolved into 1937's prize DX catch with a 20-watt transmitter. And in 1937, problems were arising in Europe that would affect the destiny of the world, although to hear the number of German amateurs on the air, one would not guess what lay ahead.

So the 1937 newcomer to amateur radio enjoyed the hobby to the utmost, even though by today's standards his equipment was crude, weak, and unreliable. Most of the great communication innovations lay in the immediate future. How could he guess what dazzling developments lay ahead?

Unknown to the new 1937 amateur were single sideband, double-conversion receivers, i-f filters, keyers, quad antennas, vhf fm, repeaters, DXpeditions, DXCC, direct frequency readout, transistors, phase-locked loops, pi-networks, coaxial cable, hf mobile operation, crank-up towers, radio teletype, transverters, solid-state amplifiers, synthesizers, frequency standards, counters, vhf converters, triband beams, active filters, prescalers, Morse-to-video converters, toroids, speech processors, slow-scan television, digital clocks, swr meters, TVI filters (and TVI), handie-talkies, nicad batteries, circuit boards, spectrum analyzers, microprocessors, and other necessities of the advancing 1970s.



The Complete Transmitter Diagram

Fig. 5. The 20-watt, six-band transmitter of W6FFF typifies the beginner's phone transmitter of 1937. Many amateurs substituted the 6L6G ($1.25) for the more expensive 807 ($3.50). Modern crystals would be destroyed by the 6L6G power oscillator, but heavy-duty crystals were available in 1937 with blanks which were larger than a postage stamp. The audio system was designed for a single-button carbon microphone, and the power supply featured an 83-type mercury vapor rectifier which provided high current at a very low voltage drop. The transmitter was designed to be used with an external antenna tuner.

The necessities of today, however, were the unheard of luxuries of yesterday. The beginning amateur of 1937 could buy a good, "all-wave" receiver with a bandspread dial for under $50. He could build a one- or two-tube CW transmitter for about $15, provided he could find a junked broadcast receiver to rip apart for components. A Zepp antenna could be built for a few dollars. And for less than $70, he was on the air! The equipment was simple and even if he couldn't understand all the complexities of the bandswitching receiver, chances were that the beginner could persuade the local radio repairman to get it going for a dollar or two.

And so it was in those less-complicated days that the beginner got his start in amateur radio. He didn't miss the sophisticated gear of the seventies that confronts today's beginner. But the fun, the thrill of amateur radio, was surely present in 1937, as can be testified by the large number of old timers, licensed about that time, who recall with pleasure their first days as a beginning amateur, when each new day brought more discovery of the wonderful world of amateur radio.

About the Writer. W6SAI was licensed in 1934 and in January, 1937, had the thrill of becoming the seventh USA phone station to win the WAC (Worked all Continents Award). On January 16, 1937, he worked VU2CQ in Bombay, India, on 20-meter phone using a home-built 120-watt transmitter and a home-built superhet receiver. The antenna was a dipole. Upon completing this feat — at about 5 AM — W6SAI startled his parents out of their wits by rushing into their bedroom, yelling, "I did it! I did it!" Needless to say, their enthusiasm for the feat was tempered by the early hour and by the fact that they had been sound asleep! **HRH**

a look at

those days before spark...

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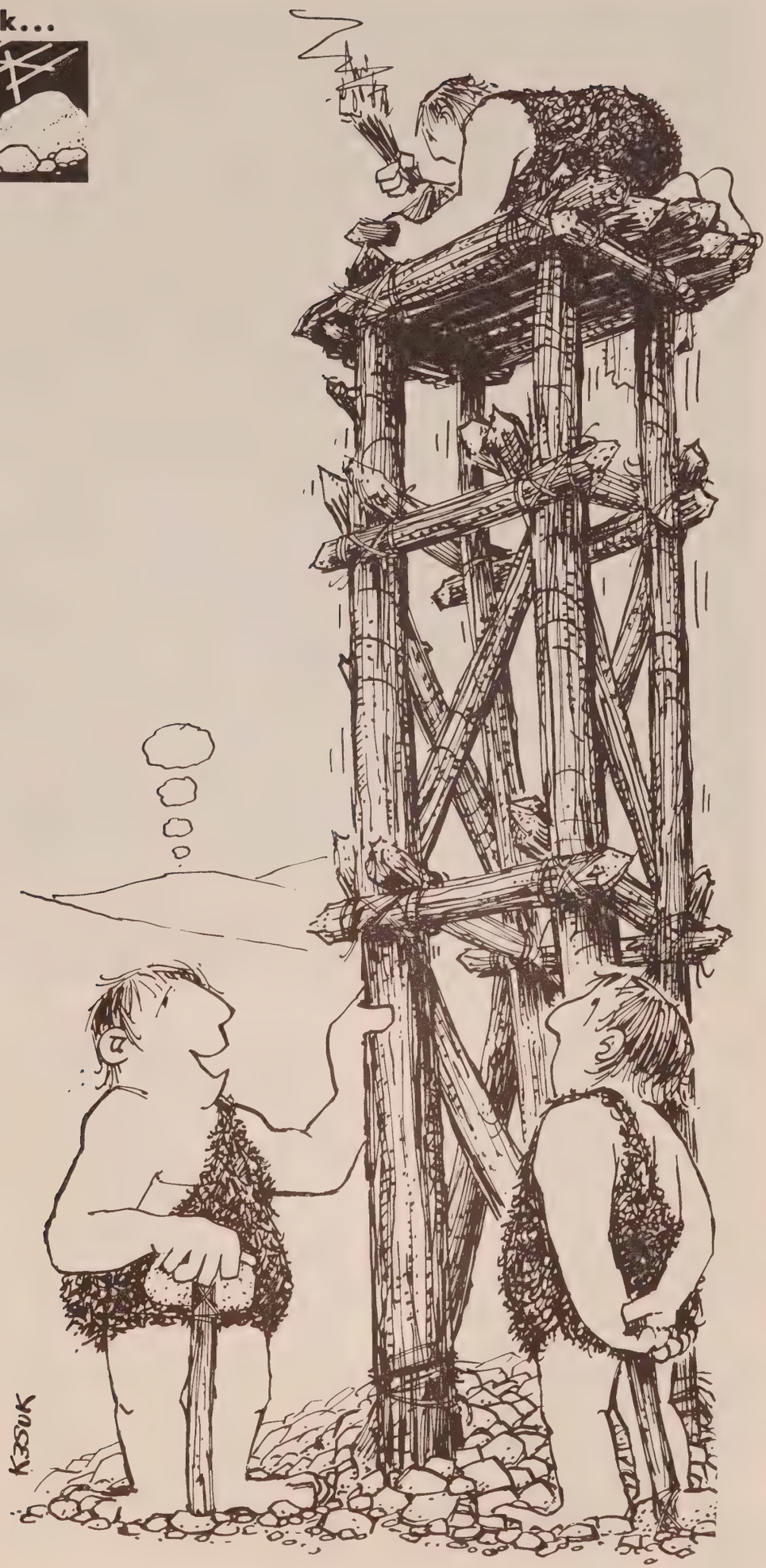
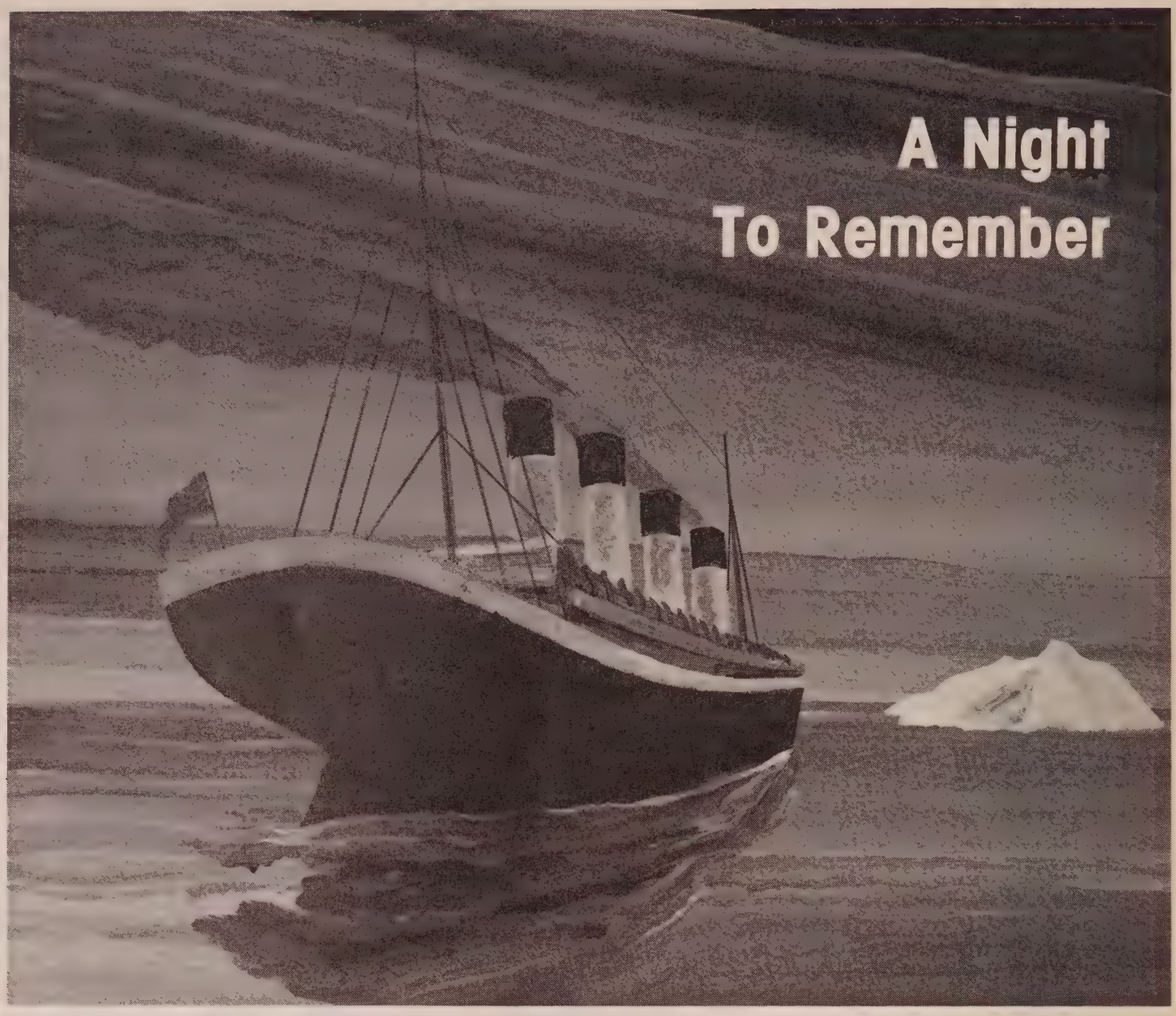


. . . so I sez to him look . . . you want your signal to get out, you gotta get it up in the air . . .



A Night To Remember

BY WILLIAM I. ORR, W6SAI

It is said that when a leaf falls the future of the world changes. Perhaps so. And if this is true, then did the sinking of the vessel *Titanic* indirectly influence the fate of amateur radio? At least one amateur thought it did, and this is his story.

The story starts way back in 1912. On the night of Sunday, April 14, to be exact. That was the night the Titanic *sank. This great new White Star liner was on her maiden voyage from Southampton, England, to New York City. She was 883 feet long, the biggest ship ever launched, and said to be unsinkable because of her double bottom and water-tight bulkheads; although how anything heavier than water could be "unsinkable" is not apparent. At any rate, she was widely advertised to the travelling public as unsinkable. She carried, on this occasion, 1348 passengers and a crew of 860**

At 11:45 that night, off the Newfoundland Banks, she hit an iceberg and within two and one-half hours had gone to the bottom. Of the passengers 533 were saved and of the crew 172.† The Cunard liner, Carpathia*, outward bound from New York, that made the rescue turned about and conveyed the survivors to New York.*

When the Carpathia *proceeded from the scene of the wreck at 8:30 in the morning after the disaster, message blanks were handed to the survivors and they were told they could "wireless" free of charge. Nearly all availed themselves of the privilege so that the operator was ordered to disregard all calls to the ship*

*In the various literature about the *Titanic*, there is a disagreement in the number of passengers and crew; one source indicates a passenger list of 1316 and a crew of 892. **Editor**

†Here, too, figures differ; one report has 705 total survivors. **Editor**

except such as had to do with instructions to the operator and to the captain.

The range of the Carpathia's spark transmitter was only about 100 miles in daylight. As one shore station along the American coast found it increasingly hard to receive the ship's signals, the next station down the coast took up the burden of copying the avalanche of shoreward-bound messages. The work on the ship was so heavy that operator Cottam, worn out with continuous duty since Sunday morning, collapsed at the key on Tuesday night. It was then that Bride, the operator rescued out of the water after the Titanic went down, had recovered enough from his injuries to take over the task of moving the tremendous backlog of messages.

The Fessenden reception station

The Carpathia's set was a Fessenden. At that time Fessenden's main factory was in Pittsburgh, Pennsylvania. He also had a small plant in one of the huge manufacturing buildings of the Bush Terminal — advantageous to him because it was near the Brooklyn (New York) Navy Yard, where he was equipping some of the ships of the Navy. I was interested in what was going on at the Brooklyn plant. As an operating Vice-President of the Bush Terminal Company I had been able to accommodate the Fessenden Company in various small ways. Among other favors, they had been permitted to use without charge the roof of the 600-foot building in which their plant was established. At each end of the roof they had erected steel towers for their antenna. And I had built a fireproof shack for them in the middle of the roof. So, while visitors were generally barred, I had the run of the premises.

The Fessenden Company wished to copy as much of the Carpathia's traffic as possible, by request, I understood, of authorities in Washington where the Carpathia could not be heard. In the emergency I hustled about and helped the Fessenden men to get the new shack in commission. The operator invited me to sit in with him, and we listened hour after hour to the Carpathia.

I hope I never again see such a stack of messages. An amateur occasionally handles one that gives the sympathies a wrench, but those from the Carpathia — reading both the

The Chief Marconi (wireless) operator aboard the *Titanic* was J. G. Phillips, who stayed at his key until water flooded the radio room.

text and between the lines — were just a stream of shocks. "Mother is with us but James and Father are gone." "Mary and I saved. We know nothing of the rest." "Have Father meet me at the dock. I am all that is left but do not tell him." And on and on, broken now and then by messages about the movements of the ship.

All ship and shore stations had strict orders to keep off the air and leave the air free for the Carpathia's messages. Only once did we hear a commercial station disregard that order. A heavy spark banged in, as if from a strong station nearby. It was a ship, leaving New York and calling the Carpathia. She must have had a dumb operator as the Carpathia set was working at that time. Immediately another strong station crashed in with "QRT." It was the Marconi chief in New York.

Amateur interference

Here is where the conduct of the amateurs comes in for uncompromising criticism. The air was clear of commercial stations. All amateurs were in a position to know that it was of vital importance that they keep off the air. But, no doubt, in those days, too, the amateur ranks had their full complement of dumb specimens. There was never a time when the air wasn't full of ham signals, blathering away about the Titanic and the Carpathia, or just chewing the rag about nothing at all. It was only the distinctiveness of the Carpathia's 500-cycle whine that made copying at all possible.

Many of the messages were broken or garbled because of the ham QRM. This accounted, no doubt, for the non-delivery of many urgent survivor messages.

It was this inexcusable misconduct of the New England hams — largely those in the New York area — that had the most to do with driving the whole amateur fraternity down to 200 meters. They would have been moved from the ship's wavelengths in any event, for they didn't belong there; but they would have stood much higher in public esteem if the amateur

A White Star Lines advertisement for the voyages of the *Titanic* and the *Olympic*.

White Star Line

TRIPLE-SCREW ROYAL MAIL STEAMERS

"OLYMPIC," 45,324 tons, and "**TITANIC**" 45,000 tons, are the Largest Vessels in the World.

(Fitted with Marconi Wireless Apparatus.)

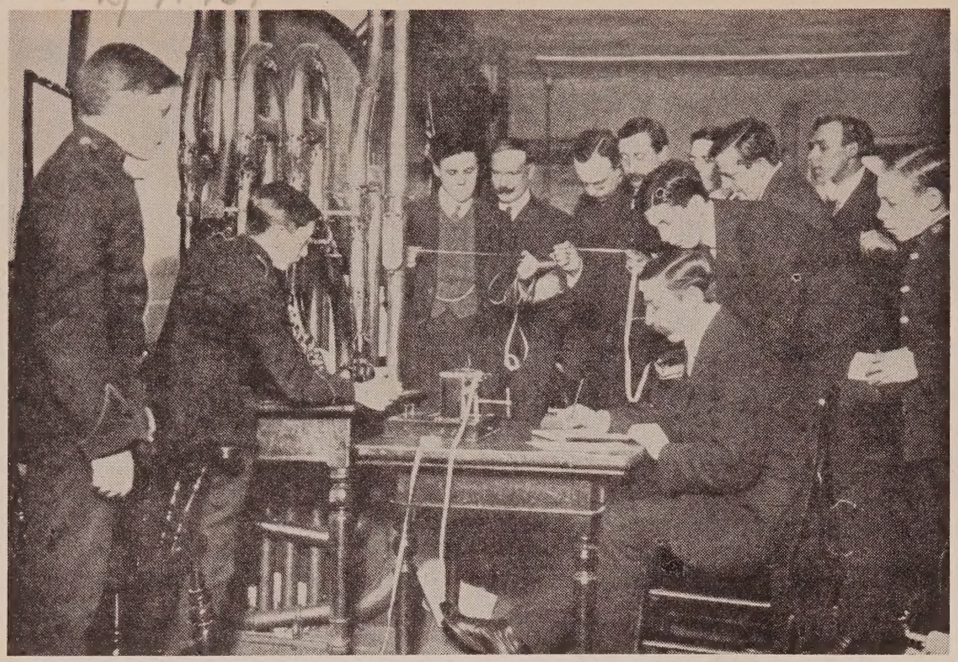
"OLYMPIC" sails from Southampton and Cherbourg to New York regularly.

"**TITANIC**" sails from Southampton and Cherbourg on first voyage to New York **April 10, 1912**

White Star Line

LIVERPOOL, LONDON, SOUTHAMPTON, NEW YORK

AFFELDER/7195



News of the disaster was relayed over electric news tape systems through centers like this one.

*organization had taken the initiative and moved out voluntarily instead of waiting to be kicked out. Or, to put it in accord with the facts of the case, the amateurs could have moved down enough to keep off the ships' wavelength instead of waiting to be kicked wholly off the air. For this was the deliberate intention of the commercial people and their adherents in Washington, who believed then that 200 meters was useless for communication.**

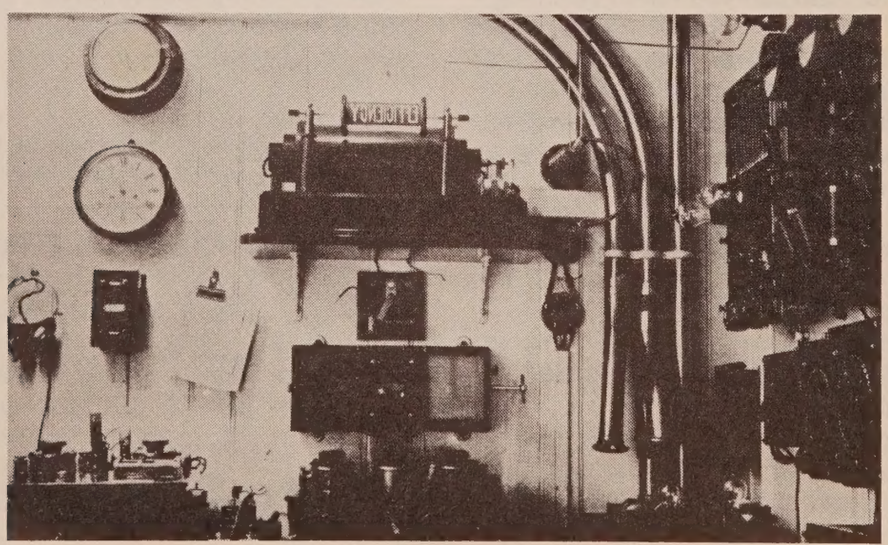
This story was told by Colonel Clair Foster, W6HM, in the October, 1933, issue of *Radio* magazine. It was a portion of editorial comment dealing with the interaction between the Amateur Radio Service and the recently completed Madrid Treaty of the International Telecommunications Union (1927), which placed restrictive measures on amateur radio. The point of the story, which is equally important today, is that all radio amateurs operate openly before the eyes of the world and their actions are observed by many who exert a life or death influence at the international conventions of the ITU. While perhaps not as blatant as in the case of the *Carpathia*, those amateurs who create intentional interference, or otherwise violate accepted laws of behavior — or the regulations of the FCC — are (by the very nature of radio) creating a public nuisance readily observed by both friends and enemies.

On the international DX bands the voice of the radio amateur is heard world wide. Even on the local bands, those unfriendly to amateur radio have ears.

A few years ago a delegate of the United States to an important ITU conference told me that a delegate of another country wished a portion of the 80-meter amateur band to be turned over to the Broadcasting Service. To emphasize his point that the 80-meter ham band was a waste of spectrum space, he had recorded a drunken party of loud-mouthed hams operating on 80-meters, making fools of themselves on the air. He was prepared to play the tape at a forthcoming conference meeting that would decide the fate of the 80-meter band! It took the United States delegate many hours of discussion and urging to get the other delegate to reluctantly agree not to play the recording at the meeting.

A word to the wise should be sufficient. Don't place amateur radio in jeopardy by unbecoming conduct on the air. Reassess your operating in terms of the unseen listener! Are *you* a credit to amateur radio? **HRH**

The wireless room on the *Olympic*, sister ship to the *Titanic*. A crystal/tube receiver and a multiple tuner occupy the bench top. A spark transmitter and induction coil are on the wall. The backwards word "efficiency" on the coil was installed that way for some unknown reason (*courtesy Titanic Historical Society*).



*The timing of subsequent events lends much support to Colonel Foster's theory. The Radio Act of 1912 was passed and signed into law on August 9, 1912, by President Taft. In this act, amateurs were relegated to "below 200 meters," with ships working at 300 and 600 meters. The government reserved 600 to 1200 meters for its own needs.

Editor

What was it like to pull that impossibly weak signal up through the noise of your regen receiver . . . afraid to move for fear your hand capacitance would awake the demon fringe-howl? Would you like to live again the moments when the operators stayed at their sets day and night handling messages from survivors of the sunken Titanic? How about sharing the hectic moments, the joys, and the inventiveness of early-day broadcasting — when radio was as new as the engineers who kept the stations alive.

That's only a sample of what radio nostalgia is about . . . some selected windows to the past from the pages of *ham radio* and *Ham Radio Horizons*.

So, relax, have something nearby to munch on, and enjoy some of our readers' favorite selections.

hr The Ham Radio Publishing Group

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